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ABSTRACT

This report deals primarily with health professional schools in California and their role in (1) education of health professionals and related personnel involved in teaching and research in health sciences and the provision of health care; (2) health sciences research; and (3) delivery of health care. Sections 1 and 2 present respectively the introduction, the scope and premises. Section 3 examines current health status, including improvements over the last half century, and deficiencies. Section 4 discusses the means and mechanisms for dealing with the problems and deficiencies and Section 5 outlines the appropriate and necessary mission of the University in the health sciences. Section 6 reviews the University's present health sciences programs. Section 7 proposes goals and guidelines for future activities that will serve to make these activities responsive to health care needs in 1980. The last section presents the University's 10-year plan for the health sciences in terms of enrollment projections, operating budget, and capital outlay program. (AF)

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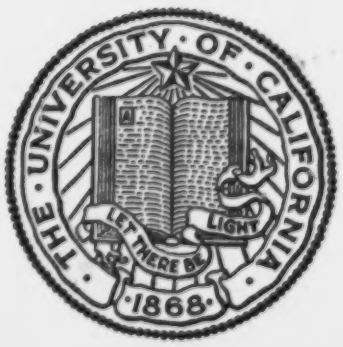
UNIVERSITY OF CALIFORNIA

Planning for the Health Sciences 1970-1980

A Ten-Year Plan



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November 1970

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UNIVERSITY OF CALIFORNIA

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CHARLES J. HITCH
President of the University

BERKELEY, CALIFORNIA 94720

November 25, 1970

The Honorable Stephen P. Teale, Chairman
Joint Legislative Budget Committee
State of California
State Capitol Building
Sacramento, California 95814

Dear Senator:

In my letter of November 6, 1970 I indicated that Legislative Report No. 7, the ten-year academic, physical, and fiscal plan for the health sciences, would be submitted subsequent to being presented to The Regents at their November meeting. The Regents have now authorized me to submit the report, titled "University of California, Planning for the Health Sciences, 1970-1980; A Ten-Year Plan". You will recall that in partial response to the Legislative request for this report we submitted two earlier documents - on February 9 and April 30, 1970, respectively. The enclosed report completes our response to that request.

While this Plan is based on the best current collective judgment, it is well recognized that changes will occur in the demand for health care services, in the nature of the health care delivery system, and in approaches to education in the health sciences. These changes are difficult, if not impossible, to predict. Consequently, this planning document will be subjected to review on a continuing basis. Furthermore, time has not permitted as extensive a review and discussion of this document by appropriate groups within the University as is desirable, but it will be discussed in depth with these groups, including formally constituted bodies of the Academic Senate, during all stages leading to the development of the health sciences programs within this general planning framework.

The Plan must also be examined critically from the point of view of its effect on other programs and functions of the University. Its implementation must not be allowed to interfere with the University's meeting other responsibilities it faces.

In its present form the Plan projects doubling the State-funded operating budget in ten years (without allowance for inflation). State support, including that for teaching hospitals, would grow from $55 million to approximately $115 million per year. The report states that the University recognizes that over the coming decade major federal and State health programs may reduce the University's requirements for clinical teaching support funds and support funds and commits the University to attempting to reduce this category of expenditures as circumstances permit. However, it must be

recognized that such funds are not only vitally important to the educational programs but also underwrite the cost of a substantial amount of health care to medically indigent patients. Thus, dependence upon the State to supply these funds will continue unless other sources become available.

The Plan foresees a total capital outlay requirement of $485 million, based on current construction costs. Allowing for cost escalation over the decade of the Plan, the total capital outlay requirement would exceed $641 million. It is expected that no more than sixty percent of this can be funded from non-State sources. This leaves a substantial amount for State financing, but program cost estimates have been reviewed critically, and I do not believe they are subject to further significant reduction. The programs can be mounted only with full financial commitment on the part of The Regents, the State Administration, and the Legislature. Furthermore, implementation of the Plan is heavily dependent upon federal financing and upon success in funding a major portion of the cost of clinical facilities from future patient income. In my judgment, implementation of the Plan is dependent upon passage of a Health Sciences Bond Issue in 1972.

The Plan reflects our serious concern about the State's health care needs and our willingness to accept our appropriate role in helping to meet these needs. By increasing the enrollments in our health science schools we will contribute to the enlarging of the State's health manpower pool and provide additional opportunities for Californians to receive training in the health sciences. At the same time, we can reduce modestly our dependence on in-migration of health professionals from other states and countries.

Yours sincerely,

Charles Hitch

Charles J. Hitch

Attachment

cc: All Members of the Joint Legislative Budget Committee
Legislative Analyst A. Alan Post
President pro Tempore of the Senate Jack Schrade
Speaker of the Assembly Robert Monagan
Chairman of Senate Finance Committee Donald Grunsky
Chairman of the Assembly Ways and Means Committee Frank Lanterman
Chairman of the Assembly Health and Welfare Committee Gordon Duffy
Director of Finance Verne Orr

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University of California

PLANNING FOR THE HEALTH SCIENCES

1970--1980

A TEN-YEAR PLAN

Second Printing

Office of the President
November 1970

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PREFACE

This ten-year academic, physical, and fiscal plan for the University of California health sciences programs has been developed under the administrative direction of the Coordinator of Medical and Health Sciences, Clinton C. Powell. The plan follows generally the recommendations and guidelines developed by the Advisory Committee for the Ten-Year Plan. Most of the material in Chapters II through V and in Chapter VII was also prepared by that committee. Members of the Advisory Committee are:

Clifford Grobstein, Vice Chancellor for Health Sciences, San Diego, Chairman
Frederick Balderston, Professor, Berkeley (Committee Member until August, 1970)
Loren D. Carlson, Associate Dean, School of Medicine, Davis
Jere E. Goyan, Dean, School of Pharmacy, San Francisco
Thomas L. Nelson, Professor, School of Medicine, Irvine
William C. Reeves, Dean, School of Public Health, Berkeley
Edwin F. Rosinski, Executive Vice Chancellor, San Francisco
C. John Tupper, Dean, School of Medicine, Davis
Charles E. Young, Chancellor, Los Angeles

Consultants:
Lester Breslow, Professor, School of Medicine, Los Angeles
Richard B. Grenfell, Associate University Architect

Summary

SUMMARY

--The state and nation are facing a manpower crisis in the health sciences. Changing patterns of health care, rapidly rising health expectations of the public, and increasing emphasis on health maintenance are requiring a larger number and a greater variety of health professionals and ancillary personnel. Statistics from the Department of Health, Education, and Welfare indicate that an additional 50,000 doctors, 200,000 more nurses, and 150,000 more technicians are needed in the health care system.

--The University of California must assume a leadership role in mounting an educational effort to meet these needs within the state, although it alone cannot and should not meet the entire educational need.

--The University projects a doubling of its output of health professionals and the training of new categories of health personnel, thus expanding and improving the currently limited opportunities for health professional education for all Californians and reducing the state's dependence on manpower supply from other states and foreign countries.

--New schools of the health sciences in the University are best located on a general campus in order to take full advantage of the broad resources available, with associated programs for postgraduate medical education and for allied health personnel in areas without a general campus.

--Through affiliations with community health care facilities and cooperative agreements with other educational institutions, the activities of the University's health science centers will be extended outward, thus expanding programs for continuing education of health professionals, a crucial need and a legitimate function of higher educational institutions.

--High priority will be given to the reevaluation of health sciences curricula, in order to assess the feasibility of shortening their duration, increasing their flexibility, and improving their efficiency and interrelatedness.

--Training experiences of various categories of health sciences students will be more closely coordinated to improve the ability of health personnel to work as members of a health care team and to improve vertical and horizontal mobility.

--The University must intensify its efforts to produce new knowledge in the health sciences in order better to understand health, to prevent and cure disease, and to organize health manpower and institutions effectively.

Thus, the University will expand its research and development efforts on new mechanisms and procedures for health care systems and will develop model health care delivery systems.

--Strengthened programs for the training of teacher-investigators are essential not only for these research programs but also for the production of more faculty for the expanded educational programs.

THE TEN-YEAR PLAN

ENROLLMENTS

With the objective of doubling health manpower output by the University within the decade, and related to review of manpower needs in each health profession, the University has developed a ten-year plan which undertakes the accomplishment of the following professional program enrollment goals.

--The University plans to double the output of dental professionals at or above the doctoral level and to educate a variety of ancillary personnel.

--The University plans to admit 1,000 M.D. students annually by 1980, representing a 133 percent increase over the present level.

--The present enrollment of interns and residents will be doubled, so that the total will reach nearly 4,000 by 1980.

--While increasing its output of practitioners needed for the health care system, the University will continue to strengthen its program for training teacher-investigators.

--Nursing programs will be planned as an integral part of each University health sciences campus having a medical school, resulting in an increase in the graduate nursing enrollment of 110 percent.

--The Plan provides for the expansion of the total enrollment in the optometry program from 198 to nearly 300.

--The School of Pharmacy will increase the number of Doctor of Pharmacy graduates to about 120 per year by 1980. The training emphasis will stress clinical experience and a new role for pharmacists as members of the health care team.

--The University will double its efforts to educate and train students in public health fields such as health care administration and environmental health planning.

--After assuring the full development of the existing School of Veterinary Medicine at Davis, with an increase of its entering class size from 83 to at least 128, the University will undertake feasibility and planning studies with regard to the possibility of developing a second school of veterinary medicine.

--The University will take a leadership role in the orderly development of new categories and uses of health workers whose training will involve a range of professional preparation below the doctoral level. By 1975 an estimated 500 persons will have been graduated in these new categories.

--The University will continue to take leadership in the training of teachers for other health professional fields. Emphasis will continue to be placed on the development of clinical training programs at University and affiliated hospitals. Programs to educate personnel at and below the baccalaureate level in such fields should continue to be concentrated at community and state colleges.

OPERATING BUDGET REQUIREMENTS

Instruction and departmental research expenditures would roughly double from $45 million to $91 million over the decade. Taking into account total expenditures, including the budgets of teaching hospitals, budgeted fund requirements from the state would grow from $55 million to $115 million.

CAPITAL PROGRAM

The estimate of total capital fund requirements for the ten-year period is slightly under $485 million. The University would expect to receive major federal support and would plan to fund significant amounts of hospital construction from loan funds. Under current federal legislation, a maximum of about 60 percent might be financed from non-state sources.

While it is certain that changes will occur in the demand for health care services, in the nature of the health care delivery system, and in the approach to education in the health sciences, the exact nature and degree of these changes is impossible to predict. Thus, while this Ten-Year Plan represents the best current collective judgment as to the contribution which the University could and should make to the health of Californians, it must be subject to continuing revision in light of future developments.

I. Introduction

I. INTRODUCTION

A. BACKGROUND OF REPORT

This report is submitted in response to the following recommendation by the Legislative Analyst in his report on the Budget Bill for 1968-69:

> We recommend that the University prepare a ten-year academic, physical, and fiscal plan for all University medical and health science schools, with a progress report to the Joint Legislative Budget Committee by November 1, 1968, and a final report by November 1, 1969. These plans should be similar in nature to that submitted [in 1967] for the Davis School of Medicine and in 1966 for the San Diego School of Medicine.

This recommendation was accepted by the Committee on Conference on the 1968/69 Budget Bill.

The University's progress report of November 1, 1968, outlined the scope and study components of the plan as then conceived and listed a number of studies to be performed concurrently.

B. STUDIES TO BE CONDUCTED BY THE UNIVERSITY, AS STATED IN THE REPORT OF THE LEGISLATIVE ANALYST ON THE 1969/70 BUDGET

1. <u>The goals and purposes of the University will be reviewed to determine and define objectives of the health sciences program.</u>

   This Ten-Year Plan includes a review of each health science program, and a definition of objectives. The following major changes in program emphasis are planned:

   a. while continuing to fulfill its mission of producing teachers, investigators, and administrators, an increase in emphasis on expansion of the production of health practitioners;

   b. emphasis on development of new professional categories in the health sciences--a recognition of the need for experimentation in educating such personnel as physician's assistants;

   c. increased emphasis on health care delivery, through clinical programs and education of appropriate personnel;

d. increased emphasis on experimentation in developing model health care delivery systems.

2. Information on the future composition of California's population will be compiled as a basis for projecting future health service demands.

The changing demographic character of California's growing population has been considered in projecting health service demands. Also influencing future health service demands will be other factors, such as changes in the technological capabilities of medical systems, and insurance and national financing programs. Our assessment is that increasing population and increasing per capita demand for health services, arising from higher educational and income levels, will outstrip any increase in productivity that may occur through increased efficiency over the decade.

3. A review will be made of the problems created by changes in personnel usage such as substitution of equipment for personnel, increases in allied health fields, and increasing specialization.

These factors are included in this report in the sections on each health profession to the extent that their impact can be predicted, and were taken into consideration in the development of specific recommendations. For example, the Plan commits the University to a major educational program to foster the development of "physician's assistants" and other new categories of health personnel as a means of extending health care delivery in a more efficient and economical manner. Analysis of the full potential of these programs and of the impact of the trainees in actual practice situations is necessary if these programs are to flourish. The University can play an important role in stimulating the development and recognition of these and other health professions in the coming decade.

4. The probable supply of manpower will be reviewed in terms of future in-migration.

California is a net importer of most of the health professions. Study of professional manpower in-migration has led to the general conclusion that the state should expect to be able to import a decreasing proportion of health manpower from other states and from foreign countries. This is predicated on several factors, especially important among which are actions that other states will take to give the manpower they train incentives to stay in local practice. This Plan does not project the possibility that this state would produce its entire needs for professional health personnel in this decade, but it does propose significant, though possibly inadequate, expansion.

5. Program cost projections will include estimates of future per-student costs, plus comparative costs at other universities.

The University has undertaken cost-finding studies at each of its mature medical schools and at the School of Veterinary Medicine, and is working closely with the Association of American Medical Colleges and the Department of Health, Education and Welfare, both of which are studying program costs.

In 1967, AAMC and HEW initiated a pilot study of program costs at seven medical centers throughout the United States. The primary problem encountered in this "Seven Centers Study" was to find an "acceptable cost allocation system that will meet the mutual requirements of individual institutions and granting, contracting, and funding agencies." The study group made certain findings, but warned that a broader base would have to be studied for the statistics to have significance and that some of the large differences between schools were due to differences in cost allocation.

In an effort to obtain more reliable data, AAMC and HEW have added thirteen schools, including one University of California medical school, to the seven in the initial study, and are at present refining procedures to avoid the problems encountered in the earlier study.

The University is cognizant of the importance of developing comparative program-cost information as one method of analysis which can lead to improved forecasting and control of costs. Upon completion of the AAMC-HEW program cost study (anticipated in April, 1971), the University will evaluate methods for using the technique used in that study.

6. Studies of space needs will assist in projecting capital requirements.

In developing the capital program for this Plan, the University has projected significant reductions in space standards and unit costs of construction, and expects to be able to accomplish these economies without diminishing program quality significantly.

In medicine, for instance, standards are being reduced 10 to 15 percent for space related to the individual faculty member, technicians, clerical personnel, and academic graduate students, inclusive of teaching, office, laboratory, and other departmental space.

The University is exploring with appropriate federal agencies ways of obtaining economies while still meeting their requirements for the awarding of construction grants. Where appropriate, waiver may be sought of certain federal requirements in order to reduce construction costs.

7. New standards will be developed for determining the amount of teaching involved in a clinical setting.

This Ten-Year Plan is predicated on the assumption that the University should strive toward reducing costs related to the clinical component of health sciences education, increasing utilization of community facilities, and reducing fiscal dependence of University hospitals on state funds.

The Plan reflects economies that will be achieved by the following means:

a. New University hospitals are to be developed at a size for efficient operation of both patient care and instructional functions.

b. Greater emphasis will be placed on affiliations with existing community and governmental hospitals. In the case of a proposed sixth medical school, a relatively smaller teaching hospital would be considered, with greater reliance placed on community hospitals for clinical teaching.

c. As the continued development of third-party insurance comes about through governmental programs, such as Medicare and Medicaid, it may be possible to reduce state fund requirements for clinical teaching support in University hospitals.

d. A major premise of the University's Ten-Year Plan is to emphasize the development of a consortium approach with community and state colleges and other universities and educational institutions, where appropriate, for effective operation of the academic and clinical training programs in the allied health professions. The University already provides clinical training at University owned or affiliated hospitals and clinics for many programs offered by state and community colleges.

8. Research and its relationship to educational programs will be studied.

The attaining of new knowledge through research is inseparable from the quality of educational programs, and this is as true in the health professions as in other academic fields.

Basic science and clinical research in the medical and other health science fields results in direct improvements in patient care. The development of new vaccines, drugs, and diagnostic and therapeutic techniques have resulted in qualitative and quantitative improvement in the health of the population. Many new techniques developed in the University's medical centers are subsequently adopted in community hospitals as, for example, kidney dialysis and open-heart surgery.

Faculty and students of high caliber are attracted to institutions that offer intellectual stimulation related to the development of new knowledge.

Related to the present need for relatively greater emphasis on professional education programs, this Plan reflects a significantly lower projection of graduate academic students (master's and Ph.D. candidates) resulting in reduced requirements for research space.

It should be noted that about 95 percent of the University's research activities in the health sciences is funded by extramural (i.e., non-state) funds.

9. Student demand for each of the health professions will be reviewed.

Applications from California citizens to the University's health science schools far exceed the available places. California ranks forty-second among the fifty states in opportunity for its residents to attend medical schools. In most health professions, the

state is not able to enroll more than 50 percent of qualified state applicants. Opportunities for California residents to obtain medical and other health sciences education in other states are even more restricted because public institutions in those states, as they do in California, generally give admission preference to their own residents. Because private schools are not expected to expand substantially over the next decade, competition for admission to their programs will become increasingly intense. The expansion of education in the health professions as proposed in this Plan would not be restricted by a lack of qualified California student applicants.

The present limitation of enrollment opportunities in California health science schools is a tragedy. California resident applicants who are fully qualified and motivated for the study of medicine and other health professions must be turned away even though both the state and national need is critical and demands for health care are continuing to grow.

10. Consideration will be given to future demand for faculty.

While the University must continue and in some cases expand its programs to educate teachers in the health science fields, this Ten-Year Plan generally reflects an increasing emphasis on the professional education of practitioners.

In the field of nursing, however, graduate programs to educate teachers of nursing science, administrators, and researchers are considered the University's primary mission, and the University projects only a moderate growth in the size of its baccalaureate R.N. programs and will continue to cooperate with state and community colleges in educating nurse practitioners.

Similarly, in several allied health professions the University role is directed primarily toward graduate programs to educate future faculty, although it continues to develop hospital-based certificate programs for clinical training of other health personnel.

C. UNIVERSITY PLANS FOR INCREASING THE NUMBER OF INTERNS AND RESIDENTS

The 1970 analysis of the state budget included a request that the University provide in this report "alternative plans for increasing the number of interns and residents at the medical schools." This request evidently reflects legislative recognition that physicians are most likely to practice in the locale where they take their internship and residency training. Also, during their training period, "house staff" members render valuable services in University and affiliated community teaching hospitals and are often teachers of undergraduate medical students. Their presence is recognized as a major factor in improving the quality both of health care in hospitals and instruction in medical schools.

The University is following several courses of action to increase the numbers of interns and residents. This Ten-Year Plan proposes the growth of house staff programs from the present level of 1,943 interns and residents in University and affiliated hospitals to a total of 3,945 by 1980, an increase of over 100 percent during the decade. Further discussion will be found in the chapter on "Guidelines and Goals."

D. PHASE I AND PHASE II REPORTS

In January, 1970, the University submitted a report entitled "Planning for the Health Sciences, 1970 through 1980; Phase I--Ten-Year Projections of Existing Programs." That report included ten-year projections of enrollment, faculty, and operating and capital budgets for programs in health sciences schools which were already recognized in the University's five-year operating and capital budgets. The report also presented a summary of studies of health manpower utilization and education.

In April, 1970, the University submitted a report titled "Planning for the Health Sciences, 1970 through 1980; Phase II--A Progress Report." This report briefly discussed the status of development of the Ten-Year Plan, reviewed a number of existing University programs not covered in the Phase I document, proposed an outline for the final report, and listed a series of issues to be considered in development of the final report.

E. ISSUES FROM PHASE II REPORT--THE UNIVERSITY'S COMMITMENT TO CONTINUED HEALTH SCIENCES PLANNING

The University's Phase II report of April, 1970, identified fifteen issues of importance to the University, to the state, and to the nation, as follows:

1. The relative priority to be assigned to the University's education, research, and service programs.

2. The University's role in comprehensive health planning.

3. The responsiveness of the University's health sciences programs to the need for more economical, readily accessible, and effective health care delivery systems.

4. The type and size of health services delivery programs necessary for the University to carry out adequately its educational and research programs.

5. Continuing review of the need for modernizing and assuring relevance of health sciences curricula.

6. Development of new kinds of health personnel.

7. Attention to devising health sciences educational programs which permit upward mobility within the professional health fields.

8. Consideration of programs to bring into the mainstream of the health manpower pool persons who have had military health care experience.

9. Continuing study of the needs of the state for health manpower.

10. Study of facilities needs, including hospitals and other clinical facilities related to health sciences educational programs.

11. Continued review of licensing and certification requirements as relevant to health manpower.

12. Study of the appropriate role of the University in continuing education for health and allied health professionals.

13. Continuing study of the University's mission in health sciences education, in relationship to the state colleges and community colleges.

14. Constant attention to the role of the health sciences in the University in dealing with environmental problems.

15. Consideration of the state's responsibility for health research.

To the extent that directions are clear, these issues are reflected in this Ten-Year Plan. The Phase II report made clear, however, that the issues are not subject to one-time answers. It stated, "While the Phase III report will address itself to these issues, their complexity and our dependence on decisions beyond the control of the University preclude the possibility of developing answers to all of them by November, 1970. However, the University recognizes the need to continue the study of these issues after the Phase III report is completed and expects to modify the Ten-Year Plan as the answers become clear."*

*The Phase III report was developed independently of a report of the Carnegie Commission titled Higher Education and the Nation's Health, which was released as this document went to press.

II. Scope and Premises

II. SCOPE AND PREMISES

A. SCOPE OF REPORT

This report deals primarily with health professional schools and their role in (1) education of health professionals and related personnel involved in teaching and research in health sciences and the provision of health care; (2) health sciences research; and (3) delivery of health care. It is important to emphasize that many disciplines outside the health professional schools are becoming increasingly important to the education of health professionals, to research in health services, and to the provision of health care. Thus, many of the University's general campus schools and departments are already heavily engaged in health-related activities, though their activities are not the direct subject of this report. Because this is a forward-looking plan, it does not deal extensively with the University's past history and accomplishments.

Principal premises underlying present planning are stated in the following section. Current health status is then examined, including improvements in the health status of the population over the last half of the century, particularly in California, with emphasis on advances in the delivery of health services, on safeguarding man from the environment, and on the production of health manpower. These improvements and advances can be credited, at least in part, to state and University efforts. Problems and deficiencies in each of these areas are also examined, because they are important factors in determining the job that has to be done.

Means and mechanisms for dealing with the problems and deficiencies are discussed, and against this background is outlined the appropriate and necessary mission of the University in the health sciences, considering both its own role and its relationship with other educational institutions and community resources.

Current programs presented in the Phase I Report are brought up to date. Goals and guidelines for future activities, consonant with the mission of the University, are then proposed which will serve to make these activities responsive to health care needs of the state anticipated in 1980. These goals and guidelines serve as the basis for this Ten-Year Plan.

B. PLANNING PREMISES

The following premises were adopted for purposes of the present report. They are well documented by current relevant knowledge.

Premise: Far more health personnel will be needed to provide a high level of care, as a right, to all segments of society.

Health care of high quality cannot be a commodity accessible only to a select few. The deep sense of social commitment expressed by our political leaders attests to this premise, and in the future the commitment will be implemented by a variety of efforts.

Premise: More health workers will be required to keep pace with population growth.

All evidence indicates that state and national populations will continue to grow. The United States population is expected to reach 227,665,000 by 1980, and 282,642,000 by the year 2000. The California Department of Finance predicts that the California population will reach 24,154,000 in 1980, and 33,910,000 by the year 2000.

Premise: More health workers, in greater variety, will be required with increases in the proportion of high utilizers of health services (the young and the aged) and the emergence of new health problems.

The range of health services needed will be considerably different by the end of the next decade. By 1980, approximately 25 percent of California's population will fall into the classification of "pediatric" patients, with their particular health needs. Increases in life expectancy will undoubtedly produce more elderly citizens also requiring special services and more extended-care facilities. Greater emphasis will be put on health maintenance and rehabilitation. Drug abuses, maternal and child health services, increasing mental health problems, and problems of the environment will place further demands on already understaffed health professions. Such problems will require varieties of trained health workers that do not now exist.

Premise: More health workers will be needed to staff expanded health care programs.

There is evidence that federal, state, and local programs in health care will continue and, in fact, expand. These programs will continue to address unmet needs and explore new ways of providing services, with a concomitant need for additional and new types of health personnel.

Premise: Additional educational opportunities should be provided to accommodate the increasing number of qualified students seeking admission to our health professional schools.

The needs of California's qualified students are not being met. The University cannot now admit all qualified applicants to its health professional schools. Evidence indicates that the number of these applicants will continue to increase, remaining in excess of the number of places available. A large porportion of our citizens who wish to go to health professional schools must seek out-of-state opportunities in most professions. However, a number of states are placing restrictions on admissions to their state medical and dental schools. This further diminishes opportunities in health professional education for Californians.

Premise: The flow of health professionals into California cannot be expected to continue at the present rate, given ever-increasing pressure from society coupled with restrictive actions by the federal government and professional organizations.

It is apparent that in a number of states pressure is mounting to discourage the out-migration of professionals. Furthermore, the federal government and professional groups will eventually restrict the in-flow of foreign medical school graduates. Even if these restrictions on the in-flow are not enacted officially, society will not long remain complaisant about doctors in practice in community hospitals who are graduates of foreign medical schools and have only minimal knowledge of English, and have met only minimal qualification standards.

Premise: Educational institutions will have to accommodate to the changing roles and educational needs of health personnel over the next decade.

Technological advances and the introduction of more sophisticated techniques will both create new tasks and eliminate and redistribute old ones. The role of health personnel is ever-changing. Certain health personnel will no longer be required; new types of health workers will continue to be developed; existing health personnel will assume greater and more diversified responsibilities; the sharing of responsibility and redelegation of responsibility will continue; new professional subspecialties will emerge.

Premise: More varied resources will have to be utilized to produce the additional health personnel needed.

Because the need for health personnel will continue to rise, every resource for educating and training these personnel will have to be utilized. Activities and programs for producing health workers must be expanded in secondary schools, junior colleges, state colleges, universities, private and public hospitals, public health agencies, voluntary health organizations, and professional organizations.

Premise: The role of institutions of higher education in educating and training health personnel will, in this decade, continue to be guided by the Master Plan for Higher Education.

The Master Plan for Higher Education assigns specific functions to the institutions of higher education in California. It thereby encourages local collaboration among the various educational institutions in meeting health manpower needs. The University has specific responsibility for training in the health professions of medicine, dentistry, and veterinary medicine. The development of new programs leading to a doctoral degree is one of the key missions of the University except for those degrees which can be given jointly with state colleges. The University also cooperates with appropriate institutions in developing terminal vocational-technical programs.

Premise: Through research on methods, utilization of health workers and delivery of health care must be improved as a partial solution to the health manpower shortage.

The increase in health workers being produced is not expected to overcome entirely the problems of maldistribution and inadequate numbers. To compensate for continued shortages, to increase the efficiency of health workers, and to introduce greater economy, extensive studies must be made on the utilization of health personnel and the delivery of health care. Methods for more effective linking of health resources are needed.

Premise: An increasingly well-educated populace will make greater and more sophisticated demands on the type and quality of health care.

As a larger portion of the population receives greater educational benefits, sophistication will grow as to the type and quality of medical health care that it and other segments of society should have.

Premise: The need to expand our knowledge of basic life and disease processes in order to improve human health must continue to be recognized.

The most profound improvements in the health status of the population have come, and will continue to come, from the application of research results. Examples which readily come to mind are measles and polio vaccines, and organ transplantation.

Although a number of other premises could be stated, and indeed played a role in the formulation of this report, basic to the ten-year projection for the health sciences were the premises cited: extension of good health care to all segments of society; increasing population; the varied kinds of health personnel needed; an increased health sophistication on the part of society; changing roles of existing health personnel; expanding health

care programs; exploration and testing of new sources for education and training; accommodation to the Master Plan; provision of educational opportunities for qualified students; restricted inflow of professionals; the need for continued research in health problems.

These premises lead to the inevitable conclusion not only that health care of high quality must be provided to all citizens but that such care can best be guaranteed through the education of sufficient health professionals to deliver the service.

III. Health—Progress and Problems

III. HEALTH--PROGRESS AND PROBLEMS

A. HEALTH STATUS

1. Accomplishments

The health of Californians has vastly improved during the first two-thirds of the twentieth century as illustrated by the decline in death rates, especially infant and communicable-disease death rates:[1*]

TABLE 1

SELECTED RATES OF MORTALITY--CALIFORNIA

	1910	1967
General death rate per 1,000 population	13.6	8.0
Infant death rate per 1,000 live births	116.0	19.6
Tuberculosis death rate per 100,000 population	219.4	3.0
Pneumonia and influenza death rate per 100,000 population	138.2	20.7

Most of this health advance reflects the control of communicable diseases and diseases of infancy and early childhood. Now, with persons living longer, the chronic diseases of adult life--heart disease, cancer, and stroke--have become the great killers. These three disease categories account for 65 percent of all deaths. The changing disease pattern and the resultant disease problems for the latter third of the twentieth century are illustrated in the accompanying table:[2]

*References for this section are found on page 45.

TABLE 2

FIVE LEADING CAUSES OF DEATH--CALIFORNIA

1910		1932	
Cause	% of deaths	Cause	% of deaths
Tuberculosis	15.1	Diseases of heart	24.1
Diseases of heart	13.2	Cancer	11.0
Influenza, pneumonia	7.6	Influenza, pneumonia	7.9
Accidents	6.9	Tuberculosis	7.7
Nephritis	6.5	Nephritis	7.0

1966	
Cause	% of deaths
Diseases of heart	37.1
Cancer	17.0
Vascular lesion of CNS (stroke)	10.6
Accidents	6.9
Influenza, pneumonia	3.4

Dramatic progress against some diseases is continuing, as evidenced, for example, by the sharp drop in poliomyelitis following introduction of poliomyelitis vaccine. In California, the impact of that disease fell from a level of more than 9,000 cases and 500 deaths during the four-year period 1951-1954 to fewer than 200 cases and only 11 deaths during 1961-1964.[3] In more recent years, poliomyelitis has become an extremely rare disease in California, as in the rest of the United States.

Knowledge of what is being and can be accomplished to improve health has heightened the value which Americans place on health. A 1968 survey disclosed that 51 percent of the American people as a whole give health a higher priority than having a good job.[4] Probably reflecting their inferior health status, 59 percent of poor blacks and 72 percent of poor whites in the same survey rated health as more important than having a good job.

2. Deficiencies

The health crisis in America today arises from a contradiction: vast improvement in health, according to the above measures, and in the potential for health, yet considerable ill health by other parameters--nearly 10 percent of the population is hospitalized at least once during the year, non-institutionalized persons average 7.5 days of restricted activity due to acute conditions, 11.5 percent have chronic conditions which limit their activities, and so on.

This potential for health improvement and the continuing failure to realize it for all persons was expressed by the report, "Building America's Health," from the President's Commission on Health Needs of the Nation, 1952, as follows:

> "It is now abundantly clear that the provision of adequate health services profoundly affects the individual's chances of survival and the strength and happiness of the nation as well. This fact imposes certain ethical and practical considerations upon us. When the very life of a man, or the lives of his family, may depend upon his receiving adequate medical services, society must make every effort to provide them. When this man knows that such health boons exist, available to some and denied to him, a free society will find the way to comply with the demand that he will surely make. These benefits sometimes can be obtained by the individual's own effort; but when these efforts fail, other means must be found. And democracy requires that the same high quality of service be made available to all men equally."

Health progress in the United States, although substantial, has by no means put us in the lead among nations. As is now well known, the United States lags behind more than a dozen other countries in the level of infant deaths. In 1967, the infant mortality rate in the United States was 22.1 per 1,000 live births whereas Sweden had the best national record with 12.9 infant deaths per 1,000 live births.[5] Infant health experience is poorer in the United States than in Finland, Japan, Switzerland, East Germany, France, and several other countries.

Not so well known is the fact that the United States ranks behind fifteen other countries in the rate of mortality among men between forty and fifty years of age, more than 70 percent higher than in Sweden and substantially higher than in Ireland, Czechoslovakia, East Germany, Japan, and Yugoslavia.[6] Thus, in several key measures, the health of the United States (and California, too) falls behind several other nations.

Also evident are discrepancies between various segments within our population. The health status of several groups within the nation and the state falls substantially below that of the United States as a whole. For example, 29 percent of persons in families with annual incomes of less than $2,000 have activity-limiting chronic conditions, as contrasted with only 8 percent among persons with family incomes of $7,000 or more. While this partly reflects the fact that there is a greater proportion of

of aged among the poor, even in the relatively healthy age group, 15-44, the poor are affected with limitation of activity at twice the rate of the non-poor. In the age group 45-64, the rate is three times greater among the poor.[7]

A health survey in Alameda County disclosed in detail what has been found generally in other studies: an inferior health status among people living on inadequate incomes and in poverty neighborhoods.[8] It is also evident from health data that, by these measures, income is a far greater influence on health than race. Furthermore, income aside, living in a poverty neighborhood is associated with poor health.

As commonly noted, United States indices show the "non-white" group (mostly Negroes) to be less healthy than white persons. Even more striking, and usually overlooked, is the fact that white persons do not have the most favorable health record--at least in California. Life expectancy and disability data suggest that if Californians were to pick a model for health it should be the Japanese among them.[9]

One must not, of course, infer that this is due to differences in health care. Other factors, including ways of life, are probably more important. Increasingly significant, however, is the fact that health care is rapidly becoming a more potent means of improving health than it was in prior decades. Medical care can now save many lives and avoid much disability.

B. HEALTH SERVICES

1. Accomplishments

For several decades, California has been a leader among the states in the development of health services. The California Medical Association was the first to develop a state medical society-sponsored prepayment plan, originally known as California Physicians Service. This prepayment plan was a model for the development nationally of medical society-sponsored Blue Shield plans.

The Kaiser Foundation Health Plan and its associated hospitals and Permanente Medical Group pioneered the first major hospital-based group practice prepayment plan in the country. By offering total health care at substantially less cost it has challenged traditional ways of providing health care.

California has also led in the development of group practice without prepayment features. Benefits from multi-specialty group practice have been identified as (1) the organization of a balanced group of specialists, (2) professional stimulation and quality control, (3) economic benefits permitting the more efficient use of equipment and specialized personnel, and (4) ease of consultation. The number of medical groups with three or more physicians increased from 404 in 1946 to 1,546 in 1959, to 4,287 in 1965. Considerable variation exists in the likelihood that physicians will join groups. Under 10 percent of general practitioners are in groups,

while almost 25 percent of orthopedic surgeons and over 30 percent of radiologists operate in group practice.[10] Because of shared technological and manpower resources, group practice is currently seen as one of the most promising tools for achieving comprehensive personal health care and providing patients with care twenty-four hours a day, seven days a week.

State support of health services in past years has also emphasized the development of new and better forms of health care. For example, efforts of the Crippled Children's Service in California led to improved quality of hospital and physician services for children with a wide variety of crippling conditions. Insisting upon high medical and hospital standards for children whose care was supported by state funds, CCS stimulated better services for all children in the state, through efforts such as support of centers for diagnosis and treatment of congenital heart disease and the rapid development of high-quality facilities for cardiac surgery. While there were other influences on mortality from this form of heart disease, such as the prevention of German measles, it is of interest that the mortality rate from congenital heart disease began to drop in the early 1960's and by the late 1960's was about 25 percent below the rate observed consistently during the period 1945-1960.[11]

Another example of state initiative includes the establishment of nine mental retardation diagnostic and counseling centers, as well as two kidney dialysis centers--one in northern and one in southern California. Coincident with development of these latter state-supported and other kidney dialysis centers, mortality from chronic renal disease declined about one-sixth in 1967-1968 from what it had been in the several preceding years.[12]

These examples of progress against previously highly fatal conditions, congenital heart disease and chronic kidney disease, indicate the potential of modern health care for saving lives.

One of the innovative features developed in health service in California is multiphasic screening. Initiated in pilot projects in 1950 by the State Department of Public Health, multiphasic screening has been incorporated into several California health plans to facilitate periodic health examinations and the discovery of chronic disease in early, asymptomatic phases.[13] The computerized system of automated multiphasic screening developed at Kaiser has become a model for similar endeavors throughout the country.[14] It suggests one way to incorporate preventive medicine and health maintenance services, based on latest technology, into health care.

2. Deficiencies

In spite of these and other advances, the distribution of health services to important segments of California's population has lagged, and attention to health maintenance has been inadequate throughout the health system.

Within one year after measles vaccine became available (1963), one-third of California children aged one to four years in families with annual incomes of $10,000 had been immunized but less than one-twelfth of the children in families with annual incomes under $3,000 had received the

vaccine. Tens of thousands of cases of the disease and dozens of deaths occurred in California in subsequent years.[15] Only after about five years following the introduction of measles vaccine could it be said that substantial control of the disease was being achieved. Yet during the first half of 1970 more than 1,200 cases of measles occurred--twice as many as during the same period of 1969, and clustered in low-income areas.

Even for such a dramatic agent as poliomyelitis vaccine, by 1964, nine years after it became available, over half of the children aged one to four years in families with annual incomes under $3,000 had not been adequately immunized.[15]

Another important advance in health service that was long delayed in application, especially among individuals most likely to benefit, was the Papanicolaou test. In about 1950 the test proved ready for widespread use in detection of cancer of the uterine cervix, which has a 95 percent cure rate when discovered early. By 1962, twelve years later, only about half the women in Alameda County had received the test.[16]

Approximately two-thirds of native-born white women in the most favorable socio-economic circumstances had taken the Papanicolaou test at least once, whereas only one-fourth of non-white and foreign-born women in the poorest socio-economic circumstances had received the test. Among Negro women in Alameda County during 1959-61, the death rate from this disease was twice as high as that of all women in the county. In the twenty-year period 1950-1970, during the lag in application of this one technological innovation, thousands of California women died unnecessarily of cervical cancer.

The National Health Survey (1963-1964) has disclosed that, taking age differences into account, the frequency of visits to a physician by white persons with incomes greater than $10,000 per year was 10 percent higher than by those with incomes of less than $7,000 per year. For non-white persons the discrepancy was 15 percent. The frequency of visits to a physician was 30 percent greater among white persons than among non-white.[17]

In dental care, differences in utilization were even more pronounced. More than one-fifth of all persons with incomes of less than $4,000 a year had never seen a dentist. White persons with incomes greater than $10,000 a year saw a dentist three times as often as white persons with incomes under $2,000 a year.[18] The same association with income was true for non-white persons who received substantially less dental care than did white persons. Furthermore, dental care for the poor consisted largely of extractions, in contrast to the general focus on prophylaxis and fillings among those in more fortunate economic circumstances.

In recent studies of nutrition among the poor, 18 percent of persons over ten years of age reported that it was difficult and painful to bite or chew food.[19] Among the poor adults examined, decayed and unfilled teeth were six times the national average.

Not as easily quantifiable, though well documented, are barriers to service such as inability to pay (in some illnesses affecting most

strata of society); operational features causing inordinate loss of time from work, lengthy travel, long waits; specialization of services without systematization or coordination resulting in confusing choices for patients and duplication of effort; lack of rehabilitative services; and insufficient high quality intermediary care facilities and home health services.

As noted, increasingly effective methods are available for maintaining health and intervening in disease. Now, much more than twenty years ago, we can prevent a number of diseases; save the lives of many afflicted with cancer; decrease deaths from heart disease and kidney disease; rehabilitate persons to become productive citizens. Yet a five- to fifteen-year lag seems to affect application of even the most clear-cut procedures, and this delay represents failure to extend services to the poor.

C. HEALTH MANPOWER

1. Accomplishments

The health professions have been making significant strides in the face of the increases in both population numbers and societal expectations for improved health services.

Health care manpower increased from 2 percent of the total civilian labor force in the United States in 1940 to 3.9 percent in 1960 and is still growing, reflecting both an increase in the number of health professionals and the growth of allied health manpower.[20] Since 1940, the physician, nurse, and pharmacy manpower force have actually doubled (see Table 3).

The increase in absolute numbers assumes an even greater significance when viewed by health worker-to-population ratios. Between 1940 and 1969 the total United States population increased by 69.5 million people.[21] At the same time, the numbers of health manpower increased sufficiently to maintain the ratios of dentists and pharmacists to the population. Ratios of active physicians per 100,000 population gradually increased from 125 to 152. Nurse ratios changed dramatically from 215 active nurses per 100,000 people in 1940 to 331 in 1968.

Accompanying substantial population increases and the sheer numbers of health workers needed to respond to them, the health professions have also had to cope with increased medical knowledge and technological complexity, organizing their manpower systems into patterns which allow current manpower to be used effectively and efficiently--specialty practice, group practice, new uses of health auxiliaries.

The phenomenal growth in medical specialty training is reflected in the number of specialty boards, currently nineteen. Between 1931 and 1960, the number of full-time specialists increased from 24,826 to 114,578. Between 1963 and 1967, surgical specialists increased by 16.6 percent.[22] The development and use of specialists in hospitals and clinics has resulted in more efficient utilization of the limited physician resources. Specialization also was the dominant force which led physicians to group together.

TABLE 3

PERSONS IN SELECTED HEALTH OCCUPATIONS: SELECTED YEARS 1920-1968

Occupation	Year					
	1968	1967	1960	1950	1940	1920
Physicians (M.D.)	320,207	-	229,590	192.892	168,386	146,297
Dentists	100,010	-	83,198	75,529	70,982	56,152
Nurses	659,000	-	591,829	405,515	284,200	103,900
Pharmacists	122,421	-	92,710	89,211	82,583	64,236
Allied Health:						
Total Medical	-	451,500	279,600	140,000	-	-
Total Dental	-	137,000	120,000	83,200	-	-
Total Nursing	-	1,095,000	681,000	362,000	-	-
Selected Allied Health:						
Medical Technologists	-	40,000	29,736	14,000	6,000	-
Dental Hygienists	-	15,000	11,400	6,500	-	-

Sources:

Blumberg, Recent Trends and Projections of Physicians in the U.S., March 31, 1970. Unpublished Report.
Health Manpower Source Book, Public Health Service Publication No. 263, Section 20, 1969.
Health Manpower Source Book, Public Health Service Publication No. 263, Section 21, 1970.
Health Resource Statistics, Public Health Service Publication No. 1509, 1968.
The National Association of Boards of Pharmacy.
United States National Advisory Commission on Health Facilities, A Report to the President. December 1968.

The complexity of medicine and its technologies has also created new categories of skills and with them, new categories of auxiliary health manpower. In 1900 there were fewer than two auxiliaries involved in health care for every physician. By 1967, an estimated 3.4 million persons were employed in all health occupations and the ratio of health workers to physicians reached more than ten to one. Allied health workers accounted for about 654,000 (19 percent) of this total.[23] Representative of the tremendous increases in the relatively recent auxiliary health categories is a doubling of dental hygienists since 1950 and a tripling of physical therapists.

The general premise preceding the development of auxiliaries was that health professionals could increase their productivity by delegating tasks. New technological advances have eliminated the need for many skills while creating needs for new skills that can be easily mastered by others with proper training. Medical technologists perform chemical, microscopic, and bacteriological tests for pathologists. Dental hygienists perform prophylaxes, expose and process dental X-ray films, and apply fluoride solutions. Practical nurses perform drainage, irrigation, and catheterization treatment, and take and record temperature, pulse, respiration, and blood pressure. Needs for special technologists have been generated by the electrocardiography, electroencephalograph, inhalation therapy equipment, and the autoanalyzer used in medical laboratories. Clinical laboratory technicians, dental laboratory technicians, home health aides, physician's assistants, occupational and physical therapy aides, radiologic technologists and technicians, vision care technicians, and surgical aides are among new entries to the health field.

Meanwhile, science continues to advance medical knowledge, producing countless medical and health benefits. A short list highlights these accomplishments:

a. Development of technical equipment and machines--electrocardiograph, electroencephalograph and the electromyograph--instruments which trace the electrical activities of the body, permitting the physician to make diagnoses not possible a few decades ago.

b. Development of the laser for use in complex treatment and surgical processes requiring pinpoint accuracy.

c. Developments in anaesthesia which make open-heart surgery possible.

d. Invention of metals and polymers suitable for use in orthopaedic and arterial surgery.

e. Hemodialysis and kidney transplants.

f. Vital organ transplants.

g. Developments in hematology and immunology important to a host of blood diseases, Rh iso-immunization, and transplant surgery.

These accomplishments have been achieved because the health manpower to produce them has been available. At the same time, weaknesses and shortages in manpower have prevented even greater advances.

2. Deficiencies

a. National manpower shortages, with California contributing disproportionately to the problem.

The nation has not been able to produce enough doctors, dentists, nurses, pharmacists, and allied health personnel to staff existing health facilities adequately. The shortage becomes critical as frustrations are caused by long appointment delays, hours spent in waiting rooms, and difficulties in obtaining a physician or dentist at night and on weekends. Citizens are becoming increasingly apprehensive about the lack of services. There are many difficulties in making well-documented estimates of need, but a number of recent studies indicate the following unmet needs for health workers:

> If we maintain the current level of output of new physicians we will have a shortage of about 42,000 by 1973.
>
> The shortage of dentists will reach 21,000 by 1973.
>
> Even with an increase of 95,000 professional nurses, a shortage of 141,000 is anticipated by 1973.
>
> In 1968, 4,700 hospitals in the United States lacked a pharmacist.[24]

Compounding these shortages is an uneven geographic distribution of health manpower. New York and California have physician-to-population ratios of 200 and 165 per 100,000 people respectively, while Mississippi, a state with a large number of poor rural citizens, has a ratio of only 69 physicians per every 100,000 citizens.[25] Within California, the ratio of physicians active in patient care varies widely by geographical area--ranging in 1969 from 179 per 100,000 persons in the greater metropolitan areas to 108 in adjacent areas and 76 in rural areas.[26] According to the American Dental Association, a similar situation exists for dentists, with a state average of 65 dentists per 100,000 population. County rates include 60 for San Diego, 52 for Fresno, and 49 for Ventura. Similar data exist for other professions. Maldistribution is also evident within metropolitan areas. For example, a recent study in one of the largest cities in the state indicated the Model Cities Area had one doctor for 1,800 people compared to the state average of one per 600.[27]

The present scarcity results from a combination of factors. Growth in the size and the income of our population, combined with the impact of programs such as Medicare, has increased the expectations and demands of our society for health services. The health professions, themselves, failed to realize the critical shortages and did not act with foresight. Training programs were developed for local

rather than national needs, and when new technology caused shifts in needed skills, the health professions recruited from their own ranks rather than attracting new people into careers in the health sciences. Inadequate numbers of teachers and facilities compounded the educational aspects of the problem. Federal programs also contributed by attracting professionals and auxiliaries away from health education and patient care service by providing large research grant funds to meet other legitimate health system priorities, although it should be noted that physicians whose major activity is research represented only 1.2 percent of active physicians in California in 1969.[26]

California has contributed disproportionately to the total health sciences manpower crisis in the United States. Currently, California trains less than 30 percent of its physicians, 65 percent of its dentists, and 25 percent of its nurses. Of its 13,000 licensed pharmacists, 60 percent were trained in other states. Because California obtains the majority of its health professionals through in-migration, it has been draining manpower from other geographic regions--often regions with more desperate needs.

To maintain existing ratios of health personnel-to-population ratios, California will need 11,000 more new physicians, 4,000 more new dentists and 21,000 more nurses within the decade.[28] This need is predicated on the assumption that health professionals will continue to in-migrate to California at the present rate.

b. Limited opportunities for Californians to enter the health professions.

Although present state health professional education facilities are functioning at capacity, opportunities for California residents to enter the health professions are limited. California ranks forty-second among all the states in medical school entrants per capita, and forty-sixth in percentage of resident applicants who are accepted into medical schools. Of the four states ranked lower, only one had a public medical school.[10] To attain the national median of educational opportunities would require 1,500 students per class in California medical schools in 1980 compared with approximately 710 entering places available in 1970. Similar situations occur in other health professions; for example, California ranked forty-five among states in pharmacy students per 100,000 population. In 1969, the University of California had facilities to accept 4.5 percent of applicants into its medical schools, 11.9 percent into its dental schools, 69 percent into its nursing schools, and 32 percent into pharmacy.

There appear to be four alternatives with which to combat California's and the nation's critical manpower shortage: (1) increase the number of in-migrating physicians, thus continuing our debtor status; (2) increase the number of California residents entering out-of-state medical schools, also continuing our debtor status; (3) increase the number of residents entering California private schools; (4) increase the number of places available in publicly supported health professional schools.

c. Lack of correlation between skills and tasks.

Any enterprise that grows by leaps and bounds has inherent danger of developing some overlapping and some gaps in responsibilities and actions. Such has been the case in the health manpower field. As new tasks to be performed are identified, manpower to perform these tasks was required. Unfortunately, existing health workers were often assigned the tasks with little thought given to the relationship between the tasks and the skills and training of the individual given the assignment. A classic example is the nursing profession. In its recent history nurses were called upon to undertake a number of functions related to patient care that otherwise often were left undone. Many of these functions were clearly below the training of the registered nurse (RN). To correct this the nurse's aide (NA) was developed. As the NA undertook many of these assignments, by evolution she also undertook many of the prescribed nursing profession functions. Because the RN was "relieved" she was given other functions such as supervision of non-nursing staff and record keeping. As the NA undertook nursing functions she had to neglect the tasks for which she was originally created. To correct this the licensed vocational nurse (LVN) was created, so that the NA could return to what she was trained for, and the LVN handled appropriate "nursing functions." All of this produced a patient care approach that had RN's with two levels of nursing assistants below, all often performing duties for which they were not trained.

The nursing example is paralleled throughout the health occupations.

d. Need for flexibility of curricula.

One of the major reasons that the health professions have not been able to adapt rapidly to changing tasks is the inflexibility of the educational programs preparing the professionals. It is not only a matter of lead time--the change in task and the curricular response to it--but the inability of many curricula to adjust to the change. While some curricular modifications have been made, they are few and far between and soon the new program becomes as rigid as the previous one. Without flexibility in curricula, the gap between skills and tasks continues and, indeed, widens.

e. Lack of effective continuing education over a professional lifetime.

Compounding the lack of correlation between skills and tasks is the absence of effective continuing education after an individual becomes a practitioner. This lack has many roots, but the most significant is that continuing education programs have had low priority at schools of the health professions for the simple reason that funds are not appropriated for such activities. Invariably, continuing education programs must be self-supporting, depending on fees paid by the participants.

The first major effort to support continuing education came with the passage of the Heart Disease, Cancer, and Stroke Amendments of 1965, known as the Regional Medical Programs (RMP). A major and initial thrust of RMP was to increase the knowledge and skills of physicians and others in managing heart and related diseases through continuing education courses. Continuing education, by keeping health workers abreast of rapidly advancing knowledge, can make possible better health care. RMP, one of the few major public efforts in continuing education, is making only a minor dent in the need.

f. Restrictions causing deficiencies.

Factors compounding deficiencies and shortages have been the restricted educational opportunities and career choices for potential health personnel. The educational costs faced by students in the health sciences are twice as high as the costs for other graudate students. The average total expenditure by a medical student this year is $3,330. When foregone earnings are added, costs total as much as $40,000 for four years and $65,320 at the end of any required internship and residency.[29]

Yet funding alternatives are minimal in comparison with other graduate programs and may make the latter more appealing. This fact is supported by a 1964 study indicating that while only 17 percent of all medical students received non-refundable grants averaging $585, 68 percent of all arts and science graduate students and 81 percent in the life sciences received non-refundable financial aid, averaging $2,450 for the arts and sciences and $2,700 for the life sciences.[30]

High costs and limited financial aid seem to have acted as barriers to the availability of health sciences education to a large segment of our population. In 1965, it was shown that 34 percent of medical students in the United States came from upper-class backgrounds, that is, from families which represent only 3 percent of the total population of the United States.[31]

Licensure laws also place restrictions on educational programs and the availability of health science careers for large segments of the population. These laws, which were designed when many allied health careers did not exist, actually inhibit upward and lateral educational and career mobility within many health occupations. For example, nursing licensure laws do not present a consistent progression of educational and skill requirements. Licensed vocational nurses cannot smoothly advance to RN status within the framework of a designed educational continuum. Credit for many courses cannot be transferred. In order to advance, a licensed vocational nurse generally must begin her educational process over again.

Licensure laws which require a particular educational course rather than an assessing of actual skills, also inhibit many entry level employees from advancing or upgrading themselves.

These and other restrictions have inhibited a large segment of our population from entering the health sciences and have prevented undereducated employees from being upgraded into auxiliary and professional health careers. Many times these laws add months of training for categories which in actuality may not require it. If we are to attack critical manpower shortages effectively, restrictions must be reviewed and eliminated as appropriate.

D. HEALTH CARE COSTS

During the three-year period 1966-1969, annual personal health care expenditures in the United States rose from $36 billion to $53 billion, an increase of 47 percent--more than 15 percent per year. The largest and fastest growing proportion of this increase was for hospital care, bringing the latter up to 44 percent of total expenditures for personal health care in 1969.[32]

This rise took place largely under the impact of new federal programs, Medicare and Medicaid. For many years, the public (governmental) portion of health care expenditures had been stable at around 22 percent. During 1966-1969, the public component increased to 37 percent. More than $7 billion, almost half of the total rise in expenditures during the three-year period, was accounted for by federal funds for health insurance for the aged. Although private health insurance has become an increasingly popular way for Americans to meet their health care bills, it accounted for only 22 percent of expenditures in 1969. Approximately twice this amount--41 percent of the total--was derived from direct (out-of-pocket) payments, mostly at the time the care was received.

The sharp escalation of personal health care expenditures can also be expressed in per capita terms, i.e., from $183 per person in 1966 to $256 in 1969. In the latter year, the amount of $210 for those under 65, and $692 for those over 65.

Per capita expenditures for health care are less for the poor than for those in better economic circumstances. For example, in 1966 per capita expenditures for hospital, physician, and dental care came to $94 for those with family incomes of less than $2,000, and to $148 for those with family incomes in excess of $10,000. The poor spend less per capita particularly on dental care; those with the lowest income spend only $11 per person compared with $48 for persons with family income of more than $10,000; children's annual expenditures for dental care is neglected most among the poor, being only $3 compared with $24 per capita among those with incomes above $10,000.[33]

Although the poor have less spent for their health care, this amount is a larger portion of their income than the portion spent by those who are more affluent. Family outlay for personal health services in 1963 was estimated at 15.7 percent of aggregate family income for those with incomes of less than $2,000, but only 3.8 percent for families with incomes of more than $7,500.[34]

Looking at California, health care costs are noted to be substantially higher than in the rest of the United States, even though total budget costs in the state are about the same as in other urban communities. In the spring

of 1967, estimates of the Bureau of Labor Statistics for a moderate level of living for a four-member family showed the following (selected statistical areas):[35]

TABLE 4

MEDICAL CARE COSTS--SELECTED AREAS

	Total Cost of Budget	Cost of Family Consumption	Medical Care
Urban United States	$ 9,076	$ 7,221	$ 477
Boston, Massachusetts	9,973	7,900	476
New York	9,977	7,857	512
Chicago, Illinois	9,334	7,534	494
Kansas City, No. Kan.	8,965	7,136	451
Houston, Texas	8,301	6,716	487
Bakersfield	8,822	7,005	546
Los Angeles; Long Beach	9,326	7,394	635
San Diego	9,209	7,303	587
San Francisco; Oakland	9,774	7,740	555
Seattle	9,550	7,716	499

Thus, the cost for family consumption as a whole in California cities was about the same (somewhat lower in Bakersfield, a little higher in San Francisco) as in the urban areas of the United States generally. The cost of medical care in California cities, however, ranged from 14 percent to 33 percent higher than in urban United States generally. This excessive cost of medical care in California cities was one of the most striking findings in the Bureau of Labor Statistics study.

Other evidence indicating the high cost of medical care in California compared with the rest of the country comes from the report of reimbursement for Part A (mainly hospital payments) and Part B (mainly physician payments) under Medicare. Regional analyses indicate that the cost of hospital care for the aged under Medicare is about 25 percent higher in California than in the United States, as a whole, and is the highest in the United States. Within California the range of cost for medical care for the aged varies considerably, with Los Angeles County having the highest rate--in 1968 more than 70 percent higher than in the United States as a whole.[36]

Factors contributing to the high cost of medical care are extremely complex. Increased hospital costs are attributable in some part to long overdue wage increases for employees, as well as provision of expensive new technical services.

One popular misconception of this matter is that the escalation of cost is due largely to increases in physicians' fees.[37] In truth, other factors are more important. One is the extent to which services are provided and charged for. Under the fee-for-service system the economic incentive is for the provider to furnish services and submit bills for them.

Closely related to the extent of provision of services is substantial evidence that medical care costs differ widely under different health care plans. For example, while the monthly premiums are about the same for the various types of health insurance plans which California state employees may choose, the out-of-pocket costs differ widely.[38] The average costs for active employees per person per year were:

TABLE 5

HEALTH INSURANCE PLANS--COMPARISON OF NON-COVERED COSTS*

	Total	Statewide Service Plans	Idemnity Plans	Comprehensive Group Practice Plans	Individual Practice Plans
Hospital Care	$13.14	$17.07	$13.03	$ 3.68	$13.95
Out-of-Hospital Care (mostly physician services and drugs)	40.22	47.56	42.72	21.66	44.05
Total	$53.36	$64.63	$55.75	$25.34	$58.00

The out-of-pocket costs for active employees under comprehensive group practice plans were less than half as much as under the other types of plans, both from less hospitalization and from lower charges for out-of-hospital services. This difference may be related in part to incentives for preventing illness and for early detection of disease.

Another element in the cost of medical care is the cost of health insurance itself, i.e., the amount of money involved in selling, record keeping, bill paying, and other expenses, as well as profit, for insurance companies. The California Council for Health Plan Alternatives estimates that "one dollar out of every five negotiated in collective bargaining in California . . . goes for administration of welfare plans."[39]

Thus, control of medical care costs requires an approach on a broad front, not an attack on only one item, such as the level of physicians' fees.

*Data based on a 1963 survey.

E. HEALTH AND THE ENVIRONMENT

1. Accomplishments

Protection of man against the hazards of environment has long been, and continues to be, a highly important means of advancing public health.

Until recent years, the principal threats to health arose from the natural environment (for example, temperature extremes and harmful organisms including bacteria). The struggles to improve housing, to improve working conditions, and to obtain safe water and food have produced a gradually improving environmental health picture--as far as natural threats are concerned. Protection of man from injurious environmental conditions has permitted modern life to emerge. Practically everywhere in a state like California one can drink water or milk with assurance that disease-causing organisms have been eliminated. Substantial improvements in housing and working conditions have vastly reduced the burden of illness, especially from respiratory diseases.

Now, ironically, adverse environmental effects on man's health are arising not from natural conditions but from efforts to improve man's life, especially through the development of urban society. California has faced several special environmental health problems. Shortly after World War II, the state legislature recognized the hazards of malaria, encephalitis, and other mosquito-borne diseases by appropriating funds for vector control, thus stimulating a program which now embraces more than sixty local agencies covering over 40,000 square miles. As in much preventive health work, it is difficult to determine exactly how much disease has been avoided thereby. In the late 1940's, however, rapid development of water resources for irrigated land in California increased the mosquito population. In 1952, an especially heavy rainy season produced a large mosquito population and the ensuing encephalitis outbreak affected more than 800 persons and caused about 50 deaths. In 1969, the same weather conditions reappeared, with even larger acreage under irrigation and more people in the area, yet only five cases from encephalitis resulted. The mosquito-borne disease hazard which hit California sharply about mid-century illustrates a most important feature of the environmental health problems of our day--the major threat comes not from nature but from man-made conditions.

Smog is no longer only a poor joke about Los Angeles, as it was in the late 1940's. The concentration of huge populations in limited spaces like the Los Angeles basin, using swarms of automobiles as the common mode of transportation, has made photochemical smog a major environmental health problem in many cities in the state and county. Again, California recognized air pollution as a hazard and in the years following World War II the state developed model programs for control of local air pollution, with state support for them. It was not until 1960, however, that serious steps were taken to control air pollution. Such pollution not only causes eye irritation and loss of visibility but also diminishes lung function in persons with respiratory impairment; it engenders poor athletic performance; and it causes economic damage to the extent of hundreds of millions of dollars each year. On the basis of standards

for preventing injury to health, the state adopted a program for control of automobile exhaust, but one which is designed only to bring the air of 1980 back to the condition of 1940. Much remains to be done.

2. Deficiencies

During the 1960's the list of recognized environmental threats to health lengthened:

-widespread use of pesticides that create health hazards for agricultural workers and disturb the ecological balance;

-overloading streams and lakes with chemicals whose long-term effects on man are unknown but whose short-term effects on water quality are obvious;

-accumulation of solid wastes at an alarming rate in metropolitan areas where the traditional means of disposal are no longer effective; and

-increasing noise, on the streets as well as in industry, another environmental spoiler.

By the end of the 1960's the accelerating despoliation of the environment had aroused nationwide expressions of concern: environmental "teach-ins" on campuses; "earth days"; political statements; and reorganization of federal and state governmental agencies dealing with the environment. While much of this effort has been directed toward the esthetic, uneasiness is growing about the serious adverse effects of environmental degradation on health, sometimes obvious and demonstrable but more often only suspected.

Meanwhile, efforts to establish effective controls are overridden by pressure from technologically advancing industry to maintain short-term gains from use of its products and services. At the same time, firm knowledge of how environmental changes affect health is being gained slowly.

In 1970 it is apparent that protection of health from pollutants of air, water, and land will require much more definitive knowledge of their physiological effects. Also needed is a policy to establish controls based on standards to protect the health of all--from school children on the athletic field to elderly persons in nursing homes.

REFERENCES FOR CHAPTER III

1. U.S. Department of Commerce, Bureau of the Census, Mortality Statistics, 1932. California Department of Public Health, Bureau of Vital Statistics, 1965-1966-1967 Annual Reports.

2. California Department of Public Health, Health Intelligence Unit, Death Records.

3. California Department of Public Health, Statistical Report, 1966, Communicable Diseases.

4. Harris, Louis, "How the Poor View their Health," Sources, Blue Cross Association, 1968.

5. United Nations, Population and Vital Statistics Report, Series A, Volume XXI, No. 1, Jan. 1, 1969 and No. 2, April 1, 1969.

6. United Nations, Demographic Yearbook, 1966.

7. Department of Health, Education, and Welfare, Human Investment Programs: Delivery of Health Services for the Poor, December 1967.

8. Hochstim, Joseph, et al., "Poverty Under the Microscope," American Journal of Public Health, Vol. 58, No. 10, October 1968, pp. 1815-1827.

9. Breslow, Lester and Klein, Bonnie, "Health and Race in California," (to be published in American Journal of Public Health, 1970).

10. Blumberg, Mark, "Medicine and Related Occupations," (Unpublished Report, Office of Health Planning, University of California, Berkeley, December 1969), p. 18.

11. Belloc, Nedra, "Deaths from Congenital Heart Disease in California, 1954-64," Public Health Reports, Vol. 82, No. 7, 1967, pp. 621-626.

12. California Department of Public Health, Bureau of Chronic Diseases, "Special Report from the Regional Renal Dialysis Centers Program for the State Joint Legislative Budget Committee," April 1970 (for administrative use only).

13. Breslow, Lester, "Multiphasic Screening Examinations: An Extension of the Mass Screening Technique," American Journal of Public Health, Vol. 40, p. 274, March 1950.

14. Collen, M. F., "Surveillance and Early Diagnosis in General Practice: A Multiphasic Screening Program" Proceedings of Colloquium held at Magdalen College, Oxford, July 7, 1965, pp. 10-13.

15. California Department of Public Health, Bureau of Communicable Disease Control, 1969.

16. Breslow, Lester and Hochstim, Joseph, "Sociocultural Aspects of Cervical Cytology in Alameda County, California," Public Health Reports, Vol. 79, No. 2, February, 1964, pp. 107-112.

17. Department of Health, Education, and Welfare, Office of Program Analysis: Health Education, and Welfare Indicators, June 1965.

18. White, Elijah, "A Graphic Presentation on Age and Income Differentials in Selected Aspects of Morbidity, Disability and Utilization of Health Services," Inquiry, Vol. V, No. 1, March 1968, pp. 18-31.

19. Schaefer, A. E., "Testimony Before the U.S. Senate Select Committee on Nutrition and Related Human Needs," January 22, 1969.

20. Health Manpower Source Book; Manpower Supply and Educational Statistics for Selected Health Occupations, U.S. Public Health Service, Publication Number 263, Section 20 (United States Department of Health, Education and Welfare, 1969), p. 3.

21. California Population, 1969 (Sacramento: Department of Finance, Population Research Unit, 1969), p. 4.

22. United States Public Health Service Publication Number 263, Section 20, op. cit., p. 43, Ibid., p. 53.

23. Fenninger, Leonard D., "Health Manpower," Education in the Health-Related Professions, Volume 166, Article 3 (Annals of the New York Academy of Sciences, December 31, 1969), p. 827.

24. "Hearings Before the Sub-Committee on Public Health and Welfare," Committee on Interstate and Foreign Commerce, House of Representatives, 19th Congress on H. R. 15757 (June 11, 12 and 13, 1968), Serial 90-41, p. 59.

25. Cordtz, Daniel, "Change Begins in the Doctor's Office," Fortune, Volume 81, Number 1 (January 1970), p. 57.

26. California Medical Association, Division of Socio-Economics and Research, Bureau of Research and Planning, February 1970.

27. Weiss, Gertrud, Southeast San Diego Health Study, Comprehensive Health Planning Association, March 1970.

28. "The Health Science Construction Bond Proposition," (University of California, Spring, 1970). Figures compiled from California Medical Association and University of California data.

29. Fein, Rashi, "Medical Education" (Unpublished Report).

30. Association of American Medical Colleges, "Medical Student Finances, 1962-74," Datagrams, Volume 6, Number 7 (January 1965).

31. Rosinski, Edwin F., "Social Class of Medical Students," Journal of American Medical Association, Volume 193 (July 12, 1965), pp. 95-98.

32. U.S. Department of Health, Education, and Welfare, Social Security Administration, Office of Research and Statistics, Research and Statistics Note No. 7 - 1970, June 18, 1970.

33. U.S. Department of Health, Education, and Welfare, Human Investment Programs: Delivery of Health Services for the Poor, December 1967, p. 27.

34. Anderson, Ronald and Anderson, Odin W., A Decade of Health Services, Chicago, University of Chicago Press, 1967, p. 56.

35. U.S. Department of Labor, Bureau of Labor Statistics, Three Standards of Living for an Urban Family of Four Persons, Spring, 1967, March 1969.

36. U.S. Department of Health, Education, and Welfare, Social Security Administration, Office of Research and Statistics, Health Insurance Statistics, H1-16, April 15, 1970.

37. California Medical Association, Division of Socio-Economics and Research, "The Physician Fee Index and other Economic Indicators -- Recent Changes and Outlook for 1970." Socioeconomic Report, 10(4):2, April 1970.

38. Public Employees' Retirement System, Medical Advisory Council to the Board of Administration, Final Report on the Survey of Consumer Experience under the State of California Employees' Hospital and Medical Care Act, 1968, p. 68.

39. California Council for Health Plan Alternatives, Health and Welfare Report, 3(2):5, May 1970.

IV. Possible Means for Solving Health Problems

IV. POSSIBLE MEANS FOR SOLVING HEALTH PROBLEMS

The preceding chapter has surveyed the multitude of health problems that remain despite great advances in the understanding and the controlling of disease during this century. Indeed, many current problems stem, in part, from these very advances, and in the meantime increasing national affluence has heightened health expectancy. In addition, the health system presently lacks effective mechanisms for responding rapidly to new and changing demands. This chapter broadly outlines potentially available means for improving health, requiring action at all levels of government and the private sector. Although each will be presented separately, they are highly interdependent.

A. IMPROVING THE EFFECTIVENESS AND EFFICIENCY OF HEALTH MANPOWER

The United States has long enjoyed the luxury of highly trained physicians and other professionals performing functions not all of which require their level of knowledge and skill. Given the escalating cost of medical care and of health professional education and the almost uniform manpower shortages in the health field, the delegation of health care tasks must be reassessed. In addition, there are new technical services, as well as neglected services, which improve patient care and require orderly assignment to health personnel.

The existing and potentially useful tasks should be evaluated to establish the level of education and training required to perform them competently. There should follow: (1) assignment of functions to existing categories of personnel as appropriate; (2) revision of the training of health professionals and technicians to accommodate needed changes and accelerate production; and (3) development of new categories of personnel and related educational and training programs as suggested by regrouping of currently performed or new functions. In conjunction with these tasks, there should be a system of evaluation to test new role definitions and related curricular development.

Implementation of these steps is fraught with many practical difficulties, including: lack of expertise in the health area to conduct the necessary task analyses and to provide other industrial management techniques; time required for each step versus the pressure for immediate results; professional entrenchment leading to unwillingness to consider significant changes of role or perquisites; lack of adequate financial support (public or private) for the required program development and evaluation; inadequate coordination among educational institutions, professional societies, employers, and others to effect changes requiring simultaneous action by many groups.

B. INCREASING HEALTH MANPOWER

A variety of approaches to meet the various estimates of need for increased numbers of health professionals will be required, including:

1. Expansion of the pool from which students are drawn into the health fields. Paricularly important is improvement of entry opportunities for socio-economically disadvantaged groups now inadequately represented in the health field, and increased provision for upward career mobility.

2. Provision for expansion of enrollment in present health training programs, and development of new programs for new categories of health workers.

3. Examination of the curriculum for each profession to identify core components which can be commonly taught as a basic curriculum for several types of health professionals. Curricula should include the means for handling emerging health problems and should emphasize new ways to handle the entire spectrum of patient care from health maintenance to rehabilitation. Opportunities should be provided for accelerated specialized paths through the curriculum when appropriate. Additionally, curricula should emphasize professional mobility, including movement from one occupation to another and growth within professions as these are modified or created by advances in knowledge and technology.

4. Provision of educational opportunities of appropriate content and timeliness over a continuum from the preprofessional period until retirement from professional life. This might well result in reduced length of preparation prior to certification for professional activities, but it would also probably result in a requirement for regular renewal of proof of professional competence. Effectiveness would be increased if health professionals were kept abreast of latest treatment modalities, concepts of delivery of services, etc. A rough estimate of the half-life of knowledge obtained in professional education is now five years. Attention to continuing education is imperative to complement efforts to improve and streamline basic education in the health sciences.

A number of constraints inhibit full realization of these measures, even though the American Medical Association, the Association of American Medical Colleges, the federal government, individual professional schools, and others have strongly endorsed these actions over the past several years. Among the inhibiting factors are: (1) insufficient commitment of state and national resources to match the magnitude of the problem, including uncertainty of federal and state support for education in the health professions, particularly in construction programs; (2) adverse effects of federal budgetary cutbacks on the development and maintenance of faculty; and (3) lack of adequate student financial aid. These problems are coupled with: inadequate educational experience with health professional career ladders, licensure and certification requirements which limit rate of change in the education of health personnel and the development of new categories, and constraints due to malpractice litigation, particularly in California.

C. DETERMINING AND UTILIZING THE MOST APPROPRIATE SETTINGS FOR TRAINING OF HEALTH MANPOWER

The complexity and magnitude of the educational effort necessary to support the health care system for the next several decades requires that it be carried out in close proximity with the emerging centers of health care. This is essential to avoid the expensive process of duplication of clinical facilities solely for teaching purposes. The academic medical center is the result of this recognition. Regionalized delivery systems and research efforts are increasing the importance of the academic center's coordinating role in health professional education. Its resources equip it to lead in the planning of educational programs in the health sciences with an appropriate division of responsibility for actual instruction among such institutions as the universities, state colleges, community colleges, and community hospitals. Local coordinating groups of these institutions should be fostered (1) to take maximum advantage of available expertise and facilities in the planning and conduct of educational programs in relation to community needs and in the context of overall state requirements; and (2) to promote joint training of health professionals and allied health personnel to enhance educational economies, facilitate career mobility, and familiarize each student with the capabilities and limitations of those with whom he will later work in cooperation. Hospitals and other clinical facilities should be more widely used for on-the-job education and training. Cooperation among educational institutions is a necessity if improved health manpower programs are to be developed.

D. IMPROVING THE MEANS OF PROVIDING HEALTH CARE

The term "health delivery system" has come to be used for the organizational arrangements under which individuals with health problems receive health care. These arrangements have changed over time. Many believe that further major change is now required. Steps in the following directions have been suggested toward improving the health care system and to some extent, bettering the health status of the population--decreasing personal and social costs due to work loss, preventable illnesses, neglect of timely treatment, duplication of expensive services, and inappropriate use of costly services:

1. Increased emphasis on maintenance of health and on rehabilitation following disease to supplement the traditional--almost exclusive--concern with diagnosis and treatment of disease.

2. Increased physical and social accessibility of health services through such means as decentralization of general care, use of modern transportation and telecommunication systems where required, and recognition of cultural and social barriers which limit access to care.

3. Better arrangement for continuity of care--from the patient's first contact with a physician through referral for specialist's services, hospitalization, rehabilitation, and return to the primary physician for supervision of health maintenance and routine management. The objective should be to assure treatment at the most propitious time and by the most appropriate provider of care while avoiding delays, confusing choices for the patient, and duplication of services. Further,

appropriate resources for each given stage in the patient's course of treatment should be readily and economically available without gaps or inadequate use of available knowledge. The system should include cooperative arrangements among providers of service for transfer of patients, for example, from hospital to extended care facility to home; exchange of records; shared use of specialized services; and monitoring of utilization of services and quality of care.

4. At each step of care, more effective utilization of personnel at their highest level of skills. This involves clarification of responsibilities and relationships among the health care team as mentioned earlier in this chapter.

5. Improved public and private programs of financing medical care so that lack of money is not a barrier to service, so that red tape is cut to a minimum to reduce delays to the patient and administrative costs.

The climate now favors progress in these areas because of national alarm about the rising cost of medical care, newly awakened consumer interest and participation in health care-related activities, area-wide voluntary cooperation within the health care sector through the Regional Medical Program and the Comprehensive Health Planning Program, and the recent surge of interest in these problems in academic medical centers.

E. IMPROVING OUR PHYSICAL AND SOCIAL ENVIRONMENT

Improved work, play, and general living conditions--quality of housing, air, water, food, and interpersonal relationships--can have as profound an effect on the physical and mental health of the population as can improved means for treating disease. The spiraling incidence of morbidity from lung diseases, the increasing burden of alcoholism, drug addiction, and other antidotes to stress, and the technologically induced depersonalization in society emphasize the urgency to address environmental problems.

Close collaboration is needed among educational institutions, government, and industry (particularly in the health sciences, the environmental sciences, engineering, and the biological and social sciences). The time elapsed between problem recognition, development of solutions, and application of corrective measures and regulations must be considerably reduced.

Among the activities which could contribute significantly to an improved environment are:

1. Development of improved mechanisms for gauging public reaction to the consequences of technologic change, and encouragement of general participation in activities to control them.

2. Application of existing knowledge concerning the effects of noise and crowding on men to urban planning, and to land and resource cultivation.

3. Provision of appropriate attention in regional planning to the creation and maintenance of recreational opportunities.

4. Iritiation and implementation of effective controls of the various forms of pollution.

5. Provision of appropriate resources for evaluating environmental effects on the physical and mental health of the population.

6. Education and training of environmental specialists with technical and professional expertise to combat known environmental hazards, and to foresee the emergence of the new ones. Increased attention given to the curricula of health professionals to insure their recognition of such hazards.

F. IMPROVING THE LEVEL OF PUBLIC EDUCATION

A citizenry informed about the requirements for healthful living and motivated to act to achieve it could reduce considerably the incidence of many diseases or lessen their consequences. Unnecessary health problems stem partly from:

1. harmful habits (e.g., smoking, excessive alcohol consumption, abuse of drugs);

2. avoidable accident hazards;

3. inadequate family planning;

4. failure to seek care at the appropriate time from the appropriate source;

5. insufficient public and private efforts to improve health services and to control the quality of the environment.

To influence human behavior in desirable directions requires attention to existing personal and social values, the starting points for any change. Communication media, school curricula, adult education courses, and personal contacts at the time of providing health and related services are among the channels available to educate the public.

G. CARRYING ON RESEARCH ACTIVITIES

Any activity which depends upon knowledge can and should be improved by research. Research is fundamentally the conscious, careful accumulation and interpretation of information and experience that can lead to improved understanding of the laws and theories of nature and man.

In the health field there is urgent current need for research in:

1. The investigation of the health care systems (manpower education, training and utilization; alternative methods of financing services; organization of services; meeting the needs of special population groups). This activity is particularly critical in the present climate of acute stress and transition in the provision of services because there is a relative lack of past research to draw upon.

2. The fundamental understanding of certain basic life processes and disease mechanisms which underlie such major health problems as cancer, mental illness, arteriosclerotic cardiovascular disease, and genetic defects. In many instances, because of incomplete knowledge, we are able to detect and relieve the disease but unable to meet it effectively and quickly. This is the most expensive means of disease control. For example, polio was expensive to control with the iron lung, but is relatively inexpensively dealt with today by use of preventive vaccines. Management of many patients with severe kidney disorders by chronic renal dialysis is prohibitively expensive; but prevention or cure of glomerulonephritis and other disorders could eliminate high costs and untold suffering.

3. Basic processes in the social and behavioral sciences. A major source of change in the application of medicine to problems with which it deals may well lie at the interface between medical and social issues.

Productive research depends upon continued training of research personnel. In many ways, this is the most difficult and yet most essential of all educational programs. Education at the graduate and postgraduate levels must keep pace with the growth of the health professions in order to supply faculty, investigators for industry and public and private health programs, and public officials knowledgeable about the needs of the research process and its appropriate relation to present and emerging problems within the population.

Major support for research and graduate training in the past two decades has come from the federal government. The changing trends now appearing require examination of the roles of the several sectors of society and government which can support these activities most appropriately. With federal interest concentrating more on specific federal objectives, the state must consider whether its local and individual requirements can be met without greater measure of state participation. It is to be hoped that the state will recognize the urgency of examining these questions so that precious research resources now available to it will not be lost.

V. The University's Mission in Solving Health Problems and Meeting Health Goals

V. THE UNIVERSITY'S MISSION IN SOLVING HEALTH PROBLEMS AND MEETING HEALTH GOALS

A. GENERAL CHARACTERISTICS

The University's broad responsibilities in the area of health include: (1) generation and custodianship of scientific knowledge underlying health; (2) education of physicians and many other health professionals requiring academic training beyond the bachelor's degree; and (3) provision of direct health care to the degree necessary to satisfy the first two responsibilities and to provide a standard of excellence for the general health professional community. The University must provide a research environment favoring vigorous investigation of basic life mechanisms, of disease processes, of human behavior, and of human ecology. This research environment is essential not only for its direct product--new knowledge--but for inculcating into health professionals an awareness of the characteristics and utility of the inquiring mind, without which any learned procedure degenerates to rote memory, retarding professional advance. The spirit of investigation and inquiry emphasizes the constant search for better ways which is the guarantor of quality. Only health professionals trained in this way will provide the most up-to-date health care, probe into the criteria for maintaining a healthy environment, and seek more effective means of translating new knowledge into improved health. Through its activities, the University will provide the best health standards for the residents of the state, will make available highly specialized services for supplementing the other components of the health care system, and will be the point from which emanates knowledge for healthful living for the general population. These activities must be supported vigorously so that the University's outstanding faculty can have flexibility in responding to new educational needs; can provide leadership in the training of the many health personnel categories (a responsibility shared with the state and community colleges); and can test new systems to improve the effectiveness of health care.

In shaping its mission in the health sciences and seeking the resources to fulfill it, the University is subject to policy formulated at a number of levels:

--by the people of California as expressed through their elected representatives in the state legislature and in the executive branch of state government;

--by the federal government which is increasingly concerned with health professional education programs and establishes its own set of criteria and incentives;

--by the health professionals themselves as expressed through professional organizations, accreditation and certification systems, licensing laws, etc.;

--by the faculty, who are ultimately responsible for the curricula;

--by the University administration, which weighs needs in health sciences against needs in other disciplines.

Simultaneously, the University itself influences decision-making at all of these levels by critically studying needs, relevant social forces, and alternative solutions. It does this especially through its own research and development and through its training of students in the basic concepts underlying policy formulation and decision-making.

Within this framework, the University must devote increasing attention to the health needs of the people of the state. Continuing programs in the health science schools on the several campuses along already charted lines will not be sufficient. The University must develop new and expanded health programs to help meet today's pressing health problems. The problems are urgent and the University must respond promptly. The objective must be to mount a new major effort to evaluate and improve the education of health professionals and to modify the health care delivery systems in which they function to meet the needs of our population, particularly the urban disadvantaged and the rural populations, which are clearly far behind.

B. EDUCATION OF HEALTH MANPOWER

In California, the University is the single public institution charged with the overall responsibility to produce health professionals. As the health needs of society become larger, more complex, and more sophisticated, the University must respond by producing high quality health personnel capable of delivering care based on the most recent knowledge. As new needs are identified, roles will be redefined and new roles created. The University must develop educational programs that will prepare individuals for these roles.

This task of the University is best illustrated by the emerging need for professionals to deal with problems of health care delivery and the environment. These problems receive wide attention and generate deep concern, yet the number of individuals available to deal with them is limited. The University has a responsibility to produce such personnel to meet the ever-changing health needs of society.

Yet, it is not enough for the University merely to produce more and varied health personnel. It is in a unique position also to design and operate more relevant and efficient educational programs. The mission of the University in health science education must include the development of

core curricula, the joint training of health teams, the elaboration of educational techniques and technology, the creation of educational programs that permit upward and lateral career mobility, and the development of shortened educational programs without sacrifice of quality.

Since the University is the primary focus for the education of health professionals, it must play a significant role in the development of programs that will produce auxiliaries to work with the professionals. It is not the University's mission to produce such auxiliaries in large numbers, for other institutions are far better prepared to educate and train them. Instead, the University must develop pilot and demonstration programs for determining the types of health workers needed and the training that will be most effective. Then University models can be applied in a wide variety of other educational and training environments with the University maintaining a continuing role in identification of settings for clinical training.

The range of health personnel, professionals and auxiliaries, that will be required cannot be achieved without enough teachers. The University must maintain the central objective of educating teachers for programs undertaken in other institutions as well as its own. Failure to accomplish this for even part of a generation would be tragic because the effects are irretrievable and long-term. At the very heart of the University mission is education of some individuals each year to take leadership in the development and transmission of knowledge. Teachers are educated throughout the University, but it is the campuses with health science facilities that can best accomplish the mission for health-related instruction. Programs in the upper division, and at the master's and doctoral level, must be expanded to produce health science teachers.

Nursing provides an excellent illustration. Throughout California, associate and bachelor's degree nursing programs are developing in the state and community colleges. To staff these new programs capable faculty who can offer quality education are required. The master's and doctoral programs in nursing at the University of California partially meet the needs, but urgently need expansion.

The rapid expansion of knowledge and the fast-developing changes in the mechanisms and mode of health care delivery also call for stepping up the University's effort in continuing education. The rate of growth of clinical and laboratory breakthroughs is estimated to double every twelve years--reported but unapplied breakthroughs are footnoted with avoidable diseases and preventable deaths. Better mechanisms must be found for extending the output of excellence from the University health science centers to the entire community of health professionals, and to learn from the latter the nature of their current and anticipated problems. A two-way flow between theory and practice will be more and more important as the rate of change in health care delivery accelerates.

Thus, fulfilling the overall state health manpower goals will require that every conceivable resource be tapped. The University must participate in the planning, development, and appropriate implementation of a number

of educational programs: many of these must be conjoint with a wide variety of other educational institutions and agencies concerned with the education and training of health personnel--community and state colleges, vocational and technical educational programs, professional societies, and voluntary health agencies.

C. DELIVERY OF HEALTH CARE

Health care organization is, and probably will continue to be, in transition for a number of years during which time model systems should be tested to guide the change. Although the University cannot provide total health services to large communities, it can and should develop comprehensive health care delivery models for populations up to about 50,000. Such populations are large enough to provide a diversity representative of the general population and allow the development of more effective and efficient means of providing and financing care. At the same time they can provide teaching models for students in an environment not otherwise available. Such settings of optimal relationships among health care purveyors can be worked out with a particular focus on primary health care. Training of health professional and allied health students in new relationships can also occur, and opportunities are provided to instill principles of health maintenance, disease prevention, and rehabilitation. In such models, attention should be given to each and every component of health care, outpatient and inpatient, as well as to the system as a whole.

In addition to extending into the community, the University must maintain excellent inpatient services at its health centers, since it is in these that new knowledge can be initially translated most efficiently into service. Again, this affords a site for the most up-to-date teaching of health professional and other students, and for continuing education of practitioners. Such centers also constitute a regional resource for the newest and most complicated aspects of health care.

The University must accept a leadership role in these areas to assist the private and public sectors in finding, in an orderly and economical way, systems for improving health care while simultaneously setting standards for the general population.

D. DEVELOPMENT OF NEW KNOWLEDGE IN THE HEALTH SCIENCES

In our desire to improve health care delivery and to apply what we already know, the University's mission to further knowledge must not be neglected. The benefits from medical research during just the past twenty years--vaccines against poliomyelitis and measles, drugs for tuberculosis and mental illness, surgey of the heart, and others--vastly outweigh the cost of the research effort. The rate and implications of entirely new discoveries are so promising that we cannot afford to lose the momentum. Most such advances have come, and can be expected to continue coming, from fundamental research, coupled with clinical trials, at University health centers. This will occur, however, only if substantial investment is maintained for health science research, including the problems of health care delivery and costs. It may be noted that relevance and application are not new objectives

for the University. Its role in the health sciences is not vastly different from that so successfully maintained in agriculture, where the University has long been the source of trained personnel and new knowledge for industrial and planning organizations.

Active investigation in a field is, of course, also a way to insure quality in teaching. Experience in the health professions has shown that the best practitioners come from institutions that give attention to the education of future leaders in the fields. Each confrontation with a patient is a research project in miniature. The best possible preparation for careers in health services of the future is the education of young people in an atmosphere of research and development, with critical and analytical thinking as well as constant devotion to the improvements of quality.

E. ARTICULATION WITH OTHER UNIVERSITY PROGRAMS

The relation of health care to the physical and biological sciences led to the location of most major medical centers on University campuses, complementing the programs of both the health science schools and the general campuses. The health problems of the 1970's and 1980's clearly will require an even greater interdisciplinary effort. City and regional planning, economics, the behavioral sciences, and engineering are increasingly germane to the education of health professionals, while these fields, in turn, are invigorated by health-oriented problem-solving. Current concern with the environment is illustrative.

Beyond this, it is now clear that not only the always changing microbiologic enemies of man, but the diseases of other species that may be related to those of man must be studied. Further, the man-made natural, chemical, and physical hazards to health must be anticipated before they get beyond control. The University, through its health sicence schools, should be constantly alert to problems such as the safeguards to be established in marketing new drugs, in introducing new pesticides, and in developing new sources of power. In these activities the health science schools must interact with those who are concerned with the broader aspects of social planning, whether in relation to environmental resources or urban design.

F. ARTICULATION WITH HEALTH-RELEVANT STATE AND LOCAL PROGRAMS

The University should expand its participation in the state's effort to improve health care through planning. Although they are already involved in the California Regional Medical Programs, the University's schools of the health sciences should enter into close relationships with comprehensive health planning programs at both area and state levels for several purposes: (1) to link more effectively the development of the University's health sciences resources with those of the entire community; (2) to contribute expertise to comprehensive health planning for the state; and (3) to gather ideas for the University's work in education and research. In so doing, the University must avoid being bound by immediacy; it must also focus on the long-range and the comprehensive. A major feature of the University's participation in health planning should be the development of a better system of public education for health, including participation by health professional schools in undergraduate campus programs for the training of allied health manpower and in health education of the public.

In summary, the mission of the University of California in the health sciences is diverse: to produce health personnel; to meet the varied health needs of society with high quality professionals; to develop more efficient and effective educational programs; to experiment with new curricular approaches; to develop pilot and model programs for new types of health workers; to establish career ladders for upward and lateral career mobility; to educate teachers for other programs in the health sciences; to formulate relationships with numerous other agencies and institutions for the education and training of health workers; to investigate basic mechanisms underlying disease, new treatment modalities, and more effective means of providing health services; to join other university, public, and private programs in uncovering and meeting health needs.

The mission of the University of California in the health sciences is an expanding and ever more important one. Fulfilling it requires not only the commitment of the University, but the assurance that necessary state resources will be available. The mission must be achieved if the health needs of the citizens are to be met.

VI. The University's Present Health Sciences Programs

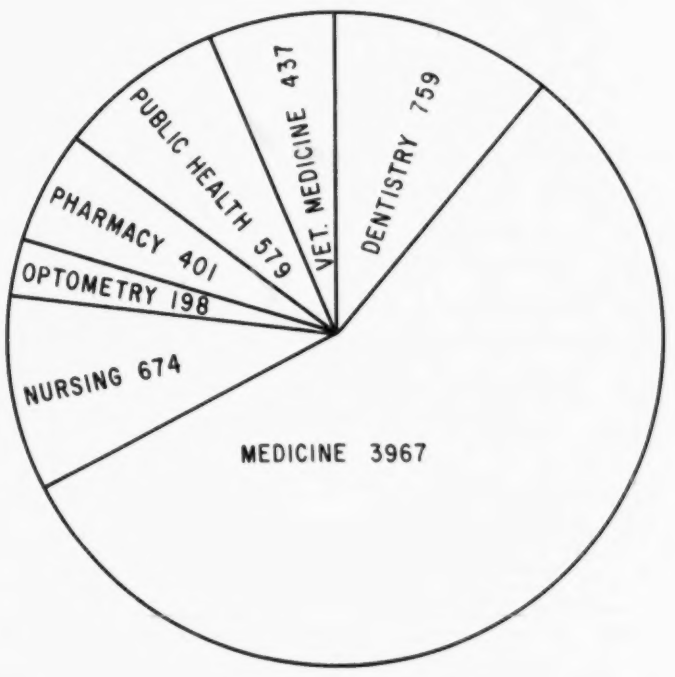
VI. THE UNIVERSITY'S PRESENT HEALTH SCIENCES PROGRAMS

During the past ten years the University has graduated more than 5,300 practitioners and teachers in the fields of dentistry, medicine, nursing, optometry, pharmacy, public health, veterinary medicine, and other health professions. However, over the same decade, needs and demands for health professionals have risen dramatically. In response, the University has increased enrollment in the health sciences programs, as reflected in the fact that the number of graduates in the period from 1965 to 1970 increased more than 1,300 over the previous five years.

This chapter reviews the current status of each of the University's health programs. As in other fields, the role of the University in the health sciences is not confined to educational activities. Faculty and students in most of the fifteen health sciences schools are directly engaged in providing health services to Californians. On-going research activities help provide better health care and add to the basic pool of knowledge in the health sciences, and numerous other public service activities provide aid to practitioners in the field as well as to the individual citizen.

A. EDUCATIONAL PROGRAMS

The University currently has over 7,000 students enrolled in health sciences education programs. The chart indicates distribution of enrollment by discipline:



Educational opportunities in University health sciences programs are being expanded for California citizens who desire to study in these fields. Regular admission programs are supplemented by special recruitment for socially and economically disadvantaged students. Educational activities and health services related to such activities for each field are surveyed below.

Dentistry

Some 759 persons are presently enrolled at the two University schools of dentistry in San Francisco and Los Angeles. With more attention to dental care and greater awareness of dental problems, such as oral cancer, the demands on dentists continue to increase. Hence, the University is involved in such efforts as a pilot training program in which dental assistants work with dental students in treating patients in order to emphasize a team concept of dental care which can result in increased efficiency and productivity.

Forty-seven persons are enrolled in the dental hygiene program leading to a Bachelor of Science degree. The program is designed to prepare students to become teachers in community college dental hygiene programs, to work as dental health educators, or to serve as licensed dental hygiene practitioners. In addition, the schools have assisted community colleges in expanding dental hygienist enrollment in their individual institutions.

More than 88 percent of those attending the two schools are enrolled in the Doctor of Dental Surgery (D.D.S.) program. Through the clinical training portion of the curriculum during the four-year educational period, these 674 students, under faculty supervision, will provide more than 1,000,000 man-hours of dental care to citizens of California.

Over 2 percent of those enrolled are pursuing professional specialty studies beyond the D.D.S. degree. The program's goals are to prepare orthodontists to perform corrective work, mainly on children, for receding jaws and poor bite patterns, and to prepare periodontists to treat gum diseases, mainly in adults over 35 years of age.

Twenty students are engaged in academic studies toward the Master of Oral Biology and master's and doctoral programs in the basic sciences. Another four persons are involved in internships and limited courses.

In response to the increasing demand for dental care, the University has instituted a dental hygienist program, has initiated pilot programs in the use of other supporting personnel, and has increased the output of dentists about two and one-half times, from 76 per year in 1960 to an expected 183 graduates in the current school year.

Human Biology

The new School of Human Biology, a graduate school on the San Francisco health sciences campus, was established in 1969 when the Regents approved a general statement of its functions.

The goal of the school is to broaden the intellectual base of the campus by providing instruction and research at the graduate level in the biological,

physical, social, behavioral, and environmental sciences related to health. It seeks to increase the range and academic quality of supporting disciplines available to the professional curricula and to work toward solutions of major problems relating to medical care costs, to the productivity of physicians, dentists, nurses, and pharmacists, and to the effective and efficient education and utilization of all types of health manpower, including future faculty.

Medicine

Over 3,900 students are enrolled for the 1970/71 year in University medical education and related sciences basic to medicine programs. Throughout the year many of these students, as a part of the educational process, assist in the delivery of health care to some of the hundreds of thousands of patients treated in emergency and outpatient departments, or as in-patients in University and University affiliated hospitals. These hospitals serve as regional medical centers throughout the state, helping to provide a high level of health care not otherwise available to citizens of California.

Nearly 1,600 of the students are enrolled in the four years of medical school curricula that lead to the M.D. degree. These future physicians --the majority of whom have already received a baccalaureate degree-- receive some 4,000 hours of intensive formal classroom and laboratory instruction along with countless hours of patient contact in clinical studies at hospitals and outreach clinics. The curricular goal is to produce highly competent physicians who can best serve the health needs of California's citizens.

In response to the physician manpower shortage, the University has increased the output of doctors in the past ten years by some 118 percent, through expansion of existing programs at Los Angeles and San Francisco and through assumption of the California College of Medicine now located at Irvine. The two new schools of medicine at Davis and San Diego, with a current total enrollment of 880 students, will add to the increased output when they graduate their first physicians in 1972.

Even with this increase, California continues to import more than 1,000 physicians from other states each year.

About 2,000 graduate physicians are involved in the internship and residency programs of the University's schools of medicine. Internships are normally one year in duration, and residency programs are generally two to five years in length. These "house staff" are directly engaged in the delivery of health care and represent about 5 percent of the physician manpower pool presently in this state. Well over 90 percent of M.D.'s now take further specialty education beyond the internship, working under senior physicians from the medical faculties and the community hospitals. There are University residency programs in all recognized medical specialties, including the new specialty of family practice.

About 383 graduate students at the medical schools are enrolled in basic science programs designed to educate persons to become instructors of future physicians and researchers in medically related fields including human anatomy, microbiology, biological chemistry, pharmacology, physiology, nutrition, and others.

In medicine, as in nursing and other fields, an important facet of the educational program is mental health education. Today, mental health uses a team approach, combining the expertise of individuals in psychiatry, psychology, nursing, and social work in a setting for carrying on educational programs and treating people for mental and emotional disorders. Each of the five University medical schools presently has such educational and service programs--the latter including operation of neuropsychiatric institutes in Los Angeles and San Francisco and community mental health programs.

The University also contributes directly to the health care of Californians through the operation of health facilities and through the patient services rendered by interns and residents and full-time clinical faculty who together make up about 7 percent of the total physician manpower available in the state.

Nursing

About 700 men and women are currently enrolled in nursing programs offered by the University at Los Angeles and San Francisco. Over 50 percent of the students enrolled in nursing are studying at the post-baccalaureate level. Most of the graduate students are working toward a master's degree in a nursing specialty and will receive either the professional Master of Nursing degree or a Master of Science degree.

Approximately one-fifth of the graduate students are enrolled in study beyond the master's degree including 24 students in the Doctor of Nursing Science degree program on the San Francisco campus.

Upon graduation, the majority of these students fill positions as teachers, deans, or directors in a variety of nursing education programs in community colleges, state colleges, and universities, while others go into leadership roles as clinical specialists, administrators, nursing consultants, and supervisors in agencies such as hospitals, public health departments, regional medical programs, outpatient clinics, and community mental health centers.

As more nurses complete the doctoral program, it is anticipated that some will elect to pursue a career in research which will focus on problems relevant to direct patient care or to the health care delivery system.

Three hundred thirty-five students are presently pursuing the Bachelor of Science degree in the nursing programs. The University's programs are designed not only to prepare nurses for practice but also to prepare students for graduate study.

During the course of educational preparation, both basic professional and graduate, students are contributing thousands of man hours of direct care to patients in a wide variety of public and private health care institutions within the state of California.

Optometry

The University's School of Optometry at Berkeley offers programs to educate professional optometrists, and teachers and researchers in the field of vision care. The school presently has 185 persons enrolled in the Doctor of Optometry curriculum. In addition to classroom and laboratory instruction, these individuals spend some 1,140 contact hours in their third and fourth years assisting in caring for the 50,000 patients seen annually at the University's optometry clinic in Berkeley.

Thirteen persons are enrolled in M.S. and Ph.D. programs in preparation for careers in teaching and research in visual sciences. A combined Doctor of Optometry and Master of Science degree is also awarded.

The number of graduating optometrists has remained relatively constant during the preceding decade. Recognizing that the California population is increasing at about 5 percent per year while total California optometric manpower has increased by only about 1 percent, the school began increasing enrollment in 1967. These graduates not only will benefit the 9.6 million citizens of California now wearing glasses or other vision aids, but also will help many others requiring various types of vision services such as orthoptics, vision training, and professional advice. As urban society becomes increasingly dependent on good, efficient vision, the need for vision care continues to rise.

Pharmacy

Just over 400 students enrolled in fall, 1970, in programs of the University School of Pharmacy at San Francisco. As graduates, some will serve Californians through pharmaceutical outlets; others will aid state and federal agencies in establishing and operating programs to control habit-forming drugs and to prevent and control diseases; and still others will become specialists in hospital pharmacy practice.

There are 352 students in the Doctor of Pharmacy program. Enrollment in this four-year professional curriculum requires a minimum of two years of pre-professional college studies. In the final year of the professional program, students spend some 800 hours working in the medical center and other hospitals and clinics as part of the health care delivery team. This innovative concept, the first program of its type in the nation, permits the student to gain important insights into the effects of drugs on patients in the clinical situation. Through this experience, he progresses beyond the traditional pharmacist role and becomes an expert in the use of drugs, thereby becoming an even more important member of the health care team.

About five persons each year undertake pharmacy intern and residency training. This program, which involves them in the pharmacy operations of various hospitals, prepares them to manage and operate hospital pharmacy departments.

The school also offers programs leading to the M.S. and Ph.D. degrees in Pharmaceutical Chemistry. Forty-five students are currently enrolled in these programs, which are designed to train persons for teaching and research.

Currently, some of these graduate students are participating in a program, interactive with clinical pharmacologists at the San Francisco Medical School, that is seeking ways of developing better and more logical use of drugs for medical purposes.

California has long been a debtor state in regard to the production of Doctors of Pharmacy. Over half of California's new pharmacists in 1969 were from other states. The University has been able to increase the annual number of graduates by only 32 percent during the past 10 years, but further increases are needed.

Public Health

The University's two schools of Public Health at Berkeley and Los Angeles offer a multiplicity of programs to train professionals to staff state and local health agencies and health care institutions and programs, and to assist in developing new models to guide health program developments. Their activities not only embrace the traditional function of protecting man through prevention of disease and preservation of his environment, but also include the improvement of conditions favoring optimum health of the population as a whole.

The graduate degree programs offered include the professional Master of Public Health and Doctor of Public Health degrees, as well as the Master of Sciences, Master of Arts, and Doctor of Philosophy degrees in selected science areas such as biostatistics, epidemiology, environmental health, and medical microbiology. A primary emphasis of the educational program is preparing individuals for work in comprehensive health planning, regional health planning, and medical care administration.

The majority of the nearly 600 students presently enrolled in the two schools are in the one- and two-year Master of Public Health programs. The University has been able to increase the annual output of M.P.H. degree recipients from about 100 in 1960 to 238 in 1969. In this category alone, more than 1,800 individuals have been graduated from the two schools since 1960. They perform a "watchdog" function in controlling infectious diseases and preserving the environment, and assist in organizing health resources for community and state action.

Veterinary Medicine

California's only School of Veterinary Medicine is located on the Davis campus of the University. Veterinarians play an important role in the maintenance of the health of the people of California in addition to caring for the many and varied animal species that provide for human needs.

Significant numbers of animal diseases, including dreaded diseases such as rabies, plague, anthrax, and psittacosis, as well as widespread debilitating diseases, such as salmonellosis, brucellosis, and toxoplasmosis, are transmissible to man and cause illness, suffering, and loss of life. Veterinarians contribute directly to the protection of people from these diseases, by controlling them in animals. Food, particularly food of animal origin, may also contain microbiological or chemical contaminants deleterious to

the health of man. Veterinary preventive medical programs are directed toward protecting people from these health hazards. Hence, veterinary medicine is an essential element in the human health delivery system.

Of a present total enrollment of almost 440 students, 313 are in the Doctor of Veterinary Medicine curriculum. They have already completed approximately four and one-half years of college or university education, and the majority hold baccalaureate degrees. The educational program includes about 4,000 hours of lecture, laboratory, hospital and other clinical instruction. The curriculum is designed to prepare graduates fundamentally oriented in comparative biology and medicine who are able, after a very short period, to function effectively in helping to meet California's health needs.

However, the national shortage of veterinarians is serious. It is estimated that 20,000 new veterinarians must be graduated by the nation's nineteen schools of veterinary medicine by 1980 to meet this shortage. These schools currently are graduating only about 1,300 per year. Approximately three-fourths of all the veterinarians entering practice each year in California are graduates of schools outside the state.

The newly established Master of Preventive Medicine graduate program provides specific training in preventive medical practice. It is designed to provide further advanced education for veterinarians who have already acquired experience and skills in state and national disease control programs. Enrollment has been limited to twelve students per year during its formative years, but will be expanded in the near future.

About 100 persons are enrolled in graduate academic programs in the school. The majority of these are preparing to teach in veterinary and medical schools, and engage in biomedical research. A growing number are combining traditional graduate education with clinical specialties as preparation for clinical teaching and research.

Experimental animals are necessary in teaching and biomedical research. Education in the fundamentals of laboratory animal medicine is an important component of the professional (D.V.M.) curriculum. The School also has a special post-D.V.M. program to prepare individuals for the veterinary specialty of laboratory animal medicine. Such specialists are critically needed for biomedical teaching and research institutions, government laboratories, industrial research institutions, and pharmaceutical companies, as well as schools of health sciences. The demand for skilled specialists in laboratory animal medicine is particularly great.

Some seventeen individuals are in the house officer training program in the veterinary medical teaching hospital. These veterinarians are being provided with advanced clinical instruction on a formal basis that prepares them for the practice of veterinary medicine or for careers in teaching and research. A career specialty program designed to provide veterinary practitioners with specialized clinical skills is presently conducted on a pilot basis.

During the past decade, the School of Veterinary Medicine at Davis has increased its D.V.M. graduates by nearly 50 percent. More than 450 D.V.M.'s have been graduated in that period and the school now enrolls 85 students in each entering class.

Other Health Professions

The University is providing training in other health career fields including exfoliative cytology, medical technology, medical illustration, orthoptic technology, physical therapy, and X-ray technology.

It also cooperates with state and community colleges in programs for the registered nurse, licensed vocational nurse, inhalation therapist, physical therapist, and many other fields.

The University has the responsibility of assuming a leadership role in the development and operation of other health career programs. An important goal is to reduce barriers to professional growth in health care fields and develop new health career ladders.

In all, some 7,000 students are enrolled in University health sciences programs. During their education they will assist in providing important health services to Californians, and upon graduation they will become valued members of the health care team.

B. RESEARCH

It is through research--both basic and clinical--that advances in the health sciences are made which directly benefit citizens of our society.

It should be noted that less than 6 percent of funding available to the University for research is provided by the state. In 1970/1971, the University health sciences research activities will bring into California more than $45,000,000 from federal sources, voluntary health agencies, and private foundations. A portion of these dollars provides directly for the employment on such projects of over 2,500 technical and other personnel.

A long list of University research projects, bureaus, and institutes could be provided. It is probably more meaningful to illustrate by examples the scope of the research being carried on by University schools of the health sciences.

Finding ways for more efficient delivery of health care; reducing or, in some cases, eliminating the need for hospital stays; and making the environment a more compatible place for man, are among the many problems being studied.

Through research in optometry, advances have been made in industrial vision safety resulting in greater protection for workers and in reduced loss of industrial man-hours. Optometric research is also concerned with making people employable. Positions in the electronic industry requiring color coding provide a good example. Through continued research on the development of special lenses, such jobs can now be filled by persons who

are totally or partially color blind. Such optometric research has also led to the development of special contact lenses used in underwater projects for the United States Navy.

Several scientists in health sciences schools are engaged in space research, where the numerous projects carried out range from nutrition to circulatory problems and contribute to the safety of U.S. astronauts. Many of these efforts provide assistance in advancing the health care of our citizens.

Studies are also underway in nursing regarding problems such as living with the chronically ill diabetic child; in medicine with efforts to provide growth hormones for otherwise dwarfed children; in public health to help alleviate obesity; in dentistry to reduce gum disease and loss of teeth; in veterinary medicine to control diseases better and to understand emphysema and other killers; and in pharmacy to make better use of the proper drugs for the sick person.

In many disciplines, there are projects on the effects of environmental pollution on health, and programs seeking answers to respiratory problems in the newborn, to heart disease, cancer, mental disorders, and other disease categories.

Research is necessary not only to advance the ability to solve such problems, but also to find better ways of delivering health care to the populace. Research in the more efficient delivery of health care is the major concern of the California Center for Health Services Research, a multicampus endeavor which is headquartered at the Los Angeles campus of the University. With this concern in mind, the center is developing methods of intercampus collaboration among University schools, state colleges, and community agencies.

C. PUBLIC SERVICE

Public service in the health sciences covers a wide variety of activities, including University health centers, outreach clinics, continuing education programs at schools and hospitals, and training sessions for health practitioners in field locations.

Each year University and University affiliated medical centers provide health services for hundreds of thousands of Californians. At these medical centers, which act as major regional health care resources, services range from emergency and routine outpatient care to highly specialized treatment that is not generally available elsewhere to the citizen. These are centers that not only provide high quality care, but also develop and export to other hospitals innovations in treatment and technology. The University hospitals successfully represent one of the nation's major endeavors within an educational system to provide direct patient diagnosis and treatment, to assist physicians in private practice, to train health professionals, and to serve as the regional health care resource for geographical areas where millions of citizens reside.

The five University medical schools are area headquarters for the federally-sponsored Regional Medical Program, which acts as a catalytic agency in drawing together health care resources and provides training programs for all

levels of health care personnel. The University-based operations cover forty-three counties in the state. The Regional Medical program has provided training and other activities in about 120 hospitals ranging from single-day training sessions for physicians and nurses in the use of the defibrillator for cardiac patients with arrhythmias, to short-cycled training films in single concepts, such as how to teach a patient to use crutches.

Community-based pilot projects have successfully used multiphasic screening to conduct over 1,000 intensive physical examinations of local citizens as a preventive health measure.

Faculty members of the various health sciences schools assist in many of the Regional Medical Program activities, thereby bringing the latest information and techniques to thousands of doctors, nurses, and other health care personnel in the field. In turn, students gain experience through participation in these programs.

Faculty members also participate in community, regional, and national organizations that are seeking ways of providing better care and better delivery, ways of using existing health care resources more logically and efficiently, and ways of adapting health care procedures to the needs of the future.

The fifteen schools of health sciences all have some form of continuing education, often provided through University Extension courses. These are designed for health practitioners, for those involved in local and state agencies dealing with health care and health planning, and for the general public. Supplementing this are continuing education programs presented in community hospitals via television.

Many schools operate clinics which serve as training grounds for future professionals while providing patient care services. Activities include outreach health clinics for migrant workers and for low income families, hospital clinics, mobile dental clinics, mobile medical laboratories, an optometry clinic, and numerous others.

The optometry clinic at Berkeley provides care for 50,000 patient visits each year, and thousands of other persons use the San Francisco program for early recognition of oral cancer and rehabilitation of the patient.

Mobile dental clinics, for example, have been utilized by the San Francisco campus since 1965 to provide dental services for handicapped and disadvantaged children in outlying areas. Each summer, dental students, hygienists, and assistants join in a central valley project providing dental services for children of migrant workers.

In one county where a University medical school is operating clinics for migrants, about 13,000 persons will receive some form of health care through the program during this year. Services are often provided at night to avoid loss of income on the part of the migrant due to daytime visits, as well as to make services available at the convenience of the entire family. The family concept is important; many times potential or actual health problems can be found in the children and eliminated or reduced through early discovery and treatment. A specific example of such service in action was the

recent case where a migrant child, during a routine physical examination at a clinic, was found to have a congenital heart condition--a hole in the heart between the two upper chambers. The child was admitted to a University affiliated medical center, where, for eighteen minutes during the repair operation, his life was sustained through the use of the heart-lung machine. The child is again with his family and can look forward to a normal, healthy life.

The case of the migrant child is not an isolated example. Because of the variety of health care resources available within the University, detected problems which cannot be dealt with at the local level can be referred to the health centers for proper treatment.

Activities of University schools of health sciences have also led to economies for the state and strengthened local programs. For example, medical schools have taken responsibility for developing and implementing county and community mental health programs. Under medical school auspices, one particular county program led the entire state in diminishing use of state hospital services by establishing a community mental health program. Faculty and students are involved in pre-school child food supplement programs, planned parenthood programs, drug information programs, and urban health programs.

In addition, the University makes available its vast library resources to all health professionals and, through inter-library loans, to other public, private, and industrial libraries. The health sciences libraries are part of the Pacific Southwest Regional Medical Library Program, a key goup in the National Biomedical Information Network and they have available MEDLARS, the Medical Literature Analysis Retrieval System, probably the single most important system for retrieval of references in domestic and foreign medical literature. Through these associations, needed health information is available to all health professionals from the physician in the rural mountain community to the specialist in a metropolitan area.

Through all of these activities the University contributes millions of man-hours each year to providing health services for Californians.

VII. Guidelines and Goals for the University's Ten-Year Plan

VII. GUIDELINES AND GOALS FOR THE UNIVERSITY'S TEN-YEAR PLAN

In this chapter, major conclusions from the preceding chapters are set forth as guidelines for a University Ten-Year Plan for the Health Sciences. Explanatory notes are included where necessary. For convenience, the conclusions are divided into categories, though the categories frequently overlap and many of the stated conclusions are interrelated and interdependent. Conclusions, therefore, may not have the validity in isolation that they have in the total context. The set of statements constitutes a program approach to planning for the University--a needed guide for its efforts in the health sciences.

General

1. THE CHANGING PATTERNS OF HEALTH CARE IN THE STATE AND NATION, THE RAPIDLY RISING HEALTH EXPECTATIONS OF THE PUBLIC, AND THE NEED FOR MORE EMPHASIS ON HEALTH MAINTENANCE REQUIRE THE UNIVERSITY TO EXAMINE ITS HEALTH PROGRAMS DEEPLY AND TO BE PREPARED TO ADOPT ALTERED APPROACHES.

2. WHATEVER THE NEW PATTERNS OF HEALTH CARE MAY BE, THEY WILL REQUIRE A LARGER NUMBER AND A GREATER VARIETY OF HEALTH PROFESSIONALS AND OTHER PERSONNEL. THE UNIVERSITY MUST ASSUME A LEADERSHIP ROLE IN ORGANIZING THE EDUCATIONAL EFFORT, ALTHOUGH IT ALONE CANNOT AND SHOULD NOT MEET THE ENTIRE EDUCATIONAL NEED.

3. WHILE CONTINUING ITS EXISTING HIGHLY IMPORTANT AND EFFECTIVE RESEARCH PROGRAM IN THE HEALTH SCIENCES, THE UNIVERSITY MUST PRESS VIGOROUSLY TO EXPAND ITS RESEARCH AND DEVELOPMENT EFFORT IN THE AREA OF NEW MECHANISMS AND PROCEDURES FOR HEALTH CARE SYSTEMS. THIS AREA PROVIDES NOT ONLY A CHALLENGE TO MEDICAL, SOCIAL, AND ECONOMIC THEORY BUT AN OPPORTUNITY TO REDUCE THE RELATIVE COST OF HEALTH CARE.

4. BETTER MANAGEMENT OF ENVIRONMENTAL RESOURCES TO ATTAIN A HIGH STANDARD OF ENVIRONMENTAL QUALITY WILL REDUCE THE NEED FOR MEDICAL CARE. EDUCATIONAL PROGRAMS TO RESOLVE THE ENVIRONMENTAL CRISIS WILL DIFFER IN CHARACTER FROM THOSE DIRECTED AT HEALTH CARE SERVICES DESPITE AN OVERLAPPING OBJECTIVE--IMPROVEMENT OF THE HEALTH STATUS OF OUR POPULATION. TO THIS END, CONSORTIA SHOULD BE FOSTERED BETWEEN EDUCATIONAL RESOURCES IN THE HEALTH SCIENCES AND IN ENGINEERING, AGRICULTURAL SCIENCES, ENVIRONMENTAL DESIGN, AND BIOLOGY.

5. TAKING THE FOREGOING FOUR STATEMENTS INTO ACCOUNT, IT IS PRUDENT IN GENERAL TERMS TO ANTICIPATE FOR THE NEXT DECADE A NEED FOR DOUBLING THE UNIVERSITY'S OUTPUT OF HEALTH PROFESSIONALS, WITH APPROPRIATE INCREMENTS IN SUCH RELATED FUNCTIONS AS UNIVERSITY HEALTH RESEARCH AND HEALTH SERVICES.

Medical and Health Sciences Education--General

6. OPPORTUNITIES FOR HEALTH PROFESSIONAL EDUCATION SHOULD BE EXPANDED AND IMPROVED FOR ALL CALIFORNIANS. IN THE PROCESS, CALIFORNIA WOULD REDUCE ITS DEPENDENCE ON OTHER STATES AND ON FOREIGN COUNTRIES FOR THE TRAINING OF ITS PHYSICIANS, DENTISTS, PHARMACISTS, NURSES, AND OTHER HEALTH MANPOWER.

Despite the state's current investment in health professional education, opportunities for California residents to enter the health professions is limited. For example, California ranks forty-second among all states in the number of medical students per capita, and forty-first in the number of pharmacy students per capita.

California is a debtor state in most all categories of health professionals. Only 30 percent of the physicians practicing in California were educated in the state (only 7.8 percent in public medical schools); only two-thirds of licentiates in dentistry each year are graduated from California schools; and only 40 percent of the pharmacists registered annually are educated locally.

Future in-migration of health professionals is very difficult to estimate. Other states may well increase their efforts to retain the students they have trained, particularly at the post-graduate level, modifying the present favorable mobility patterns.

7. NEW HEALTH PROFESSIONAL SCHOOLS IN THE UNIVERSITY SHOULD BE ESTABLISHED ON A GENERAL CAMPUS, TO ALLOW FULL ADVANTAGE TO BE TAKEN OF THE BROAD RESOURCES AVAILABLE.

The increasing complexity of the health care system and the more sophisticated technology available to health professionals for maintaining health and controlling disease require an educational program input from many disciplines outside the health field, a strong basic health sciences program, and the availability of graduate education for professional students. The feasibility of an upper division undergraduate program in the School of Human Biology at the San Francisco campus will be examined.

8. EFFORTS WILL BE INCREASED TO EXTEND THE ACTIVITIES OF EXISTING UNIVERSITY HEALTH SCIENCE CENTERS OUTWARD THROUGH:

(A) AFFILIATIONS WITH COMMUNITY AND OTHER HEALTH CARE FACILITIES, AND

(B) COOPERATIVE ARRANGEMENTS WITH OTHER EDUCATIONAL INSTITUTIONS, INCLUDING STATE AND COMMUNITY COLLEGES.

The University of California will use community resources more fully to improve the effectiveness and efficiency of its own programs and simultaneously provide advantages to the community. Further, the health science centers will contribute expertise and resources to assist other educational institutions in the developing of health sciences programs needed by the community or the state. It is recognized that, among state-supported educational institutions, the University has exclusive responsibility for programs in certain health science fields (medicine, dentistry, public health, veterinary medicine), whereas the responsibility for programs in other fields are shared (nursing, physical therapy, dental hygiene).

9. IN SUCH COOPERATIVE ARRANGEMENTS, UNIVERSITY OF CALIFORNIA HEALTH PROFESSIONAL SCHOOLS SHOULD RETAIN RESPONSIBILITY FOR THE STANDARDS OF CLINICAL TRAINING OF HEALTH PROFESSIONAL STUDENTS. THE UNIVERSITY WILL TAKE LEADERSHIP IN DEVELOPING CONSORTIA BETWEEN ITSELF AND STATE AND COMMUNITY COLLEGES TO ASSURE THAT CLINICAL TRAINING NEEDS ARE MET MOST EFFECTIVELY.

The University of California's health science centers are well equipped to serve in an advisory capacity in regard to meeting the clinical training needs of non-University programs.

10. SUPPORT FOR STATE AND COMMUNITY COLLEGE HEALTH SCIENCES PROGRAMS AT THE BACCALAUREATE AND SUB-BACCALAUREATE LEVELS SHOULD PROVIDE FOR REIMBURSEMENT OF OTHER INSTITUTIONS FOR COSTS ASSOCIATED WITH THE CLINICAL COMPONENT OF THE TRAINING PROGRAMS CONDUCTED IN FACILITIES OPERATED OR APPROVED BY PRIVATE UNIVERSITY MEDICAL CENTERS OR THE UNIVERSITY OF CALIFORNIA.

Costs to a hospital or other patient-care institution for use of its facilities and staff in clinical training of health sciences students are often considerable and not compensated. With proper reimbursement for such costs, clinical facilities could improve the effectiveness of their present participation and could probably greatly increase the number of students they could handle. To assure that these funds are being spent for high-quality clinical training, the facility should be approved for such training by a university health science center.

11. HIGH PRIORITY WILL BE GIVEN BY UNIVERSITY OF CALIFORNIA HEALTH PROFESSIONAL SCHOOLS TO RE-EVALUATION OF, AND EXPERIMENTATION WITH, HEALTH SCIENCES CURRICULA. SPECIAL EMPHASIS WILL BE PLACED ON ASSESSING THE FEASIBILITY OF SHORTENING THEIR DURATION, INCREASING THEIR FLEXIBILITY, AND IMPROVING THEIR EFFECTIVENESS AND INTERRELATEDNESS. MAJOR OBJECTIVES WILL BE DIVERSIFICATION OF CURRICULUM WITHOUT SACRIFICE OF QUALITY, AND GREATER HORIZONTAL AND VERTICAL MOBILITY.

    Curricula will provide basic health professional knowledge which facilitates professional mobility, including movement from one occupation to another and growth within professions as they are modified by advances in knowledge and technology. In designing new programs, locking of students into an increasingly inflexible educational process must be avoided.

12. A CONCERTED EFFORT WILL BE MADE TO COORDINATE THE TRAINING EXPERIENCES *OF THE VARIOUS CATEGORIES OF HEALTH SCIENCES STUDENTS IN ORDER TO DEEPEN* THEIR UNDERSTANDING OF EACH OTHER'S CAPABILITIES AND LIMITATIONS, AND INCREASE THEIR ABILITY TO WORK TOGETHER IN ACTUAL HEALTH CARE SITUATIONS.

    It is not enough that students are trained in the same facility. The various training programs must cooperate to assure appropriate interaction among the students. Team training enhances the probability of team functioning of professionals and allied health personnel.

13. CALIFORNIA SHOULD RECOGNIZE THE CONTINUING EDUCATION OF HEALTH PROFESSIONALS AS CRUCIAL TO THE FUTURE AND AS A LEGITIMATE FUNCTION OF ITS HIGHER EDUCATIONAL INSTITUTIONS.

    Because of the knowledge explosion, a health professional's education must continue as long as he is engaged in professional practice. Increasingly, curricula are being structured to take this into account. Failure to support this vital educational component could have a disastrous effect on the quality of care provided and on the gap between new knowledge and the day-to-day practice of medicine and the other health professions.

14. PRESENT AND FUTURE UNIVERSITY OF CALIFORNIA HEALTH PROFESSIONAL TRAINING PROGRAMS SHOULD BE EVALUATED AND SUPPORTED ON THE BASIS OF STATE AND UNIVERSITY NEEDS. DEVELOPMENT OF THESE PROGRAMS SHOULD NOT BE TOTALLY CONTINGENT ON FEDERAL FINANCING, SINCE NATIONAL AND STATE PRIORITIES MAY NOT ALWAYS BE THE SAME. PROGRAMS WILL, HOWEVER, BE DESIGNED TO MAKE MAXIMUM USE OF AVAILABLE FEDERAL RESOURCES.

    Federal funding and federal program priorities alone should not be allowed to determine the rate or the level of development of programs required to meet the needs of the state and University. This does not preclude the carrying out of health sciences programs in some areas mainly in response to national rather than state needs.

Education--The Several Health Professions

15. THE UNIVERSITY OF CALIFORNIA SHOULD BE ADMITTING 1,000 M.D. STUDENTS ANNUALLY BY 1980. EXPANSION OF M.D. PRODUCTION SHOULD BE ATTAINED PRIMARILY BY INCREASING RESOURCES AND OUTPUTS OF EXISTING MEDICAL SCHOOLS AND BY ADDING ONE SCHOOL. COMMITMENT TO A SIXTH SCHOOL SHOULD WAIT UNTIL DEVELOPMENT OF THE EXISTING MEDICAL SCHOOLS IS ASSURED. MEANWHILE, A STUDY SHOULD BE UNDERTAKEN OF THE FEASIBILITY OF A SIXTH SCHOOL WITHIN THE UNIVERSITY OF CALIFORNIA, INCLUDING AN UPDATING OF THE STUDY ALREADY UNDERTAKEN BY THE BERKELEY CAMPUS.

Traditionally, the need for new or expanded programs for the training of physicians has been based on estimates of the total annual need for new physicians, taking into account physician-to-population ratios, population projections, and assumptions as to deaths, retirements, and out-migration of practitioners. Acceptance of the physician-to-population ratio as a measure of need is a questionable procedure, and the assumptions used in this traditional approach are subject to error so that the final estimates are approximate at best. In the absence of more reliable procedures, however, this approach leads to the conclusion that somewhat over 2,000 new physicians will be needed annually in California by 1980. The extent to which this need can and should be met by in-migration is highly uncertain, and is itself affected by the number of physicians being trained in the state. Clearly, the number of physicians required will far exceed any reasonably attainable projected output from California's medical schools. The capability of the University to increase its output of physicians has been reviewed, taking into account the current state of development of existing facilities for medical education, the feasibility of establishing new medical schools, the lead time required for expansion of existing programs and development of new ones, the availability of faculty and clinical resources, and the need for balance between medical programs and other academic programs of the University. A plan is recommended which provides for the admission of 1,000 medical students each year by 1980, and which appears fiscally sound. California currently retains in the state approximately 80 percent of its medical school graduates, the highest retention rate of any of the fifty states. If this favorable situation continues, and given the best information available to the University regarding future plans of the private medical schools in California, this plan would leave California still dependent on in-migration for about half of its physicians.

This plan would also markedly increase the opportunities for Calfornians to attend medical school, although falling far short of the demand for medical school places. Applications to the University's medical schools already far exceed the 1,000 places which would become available with the recommended plan, and studies have indicated that applications increase as prospects for admission improve.

The proposal for a sixth school is based on several considerations: (1) there is no clear evidence that expansion of existing schools--at least beyond a class size of 150-200--is any more economical than (or even as economical as) starting a new school; (2) there are benefits from geographic dispersion of medical school facilities, both economic and in the availability of high-quality medical care; and (3) a new school would provide a base for further expansion in the 1980's, hopefully avoiding future problems similar to the current need to develop three new schools simultaneously.

16. EXISTING AND NEW MEDICAL SCHOOLS SHOULD HAVE THE CAPABILITY OF TEACHING ALL REQUIRED COMPONENTS OF THE UNDERGRADUATE MEDICAL CURRICULUM. TWO-YEAR MEDICAL SCHOOLS SHOULD NOT BE DEVELOPED.

The disadvantages of two-year medical schools outweigh any possible advantages in the University of California system. Medical school curricula no longer neatly divide into basic and clinical science components; high-quality faculty and clinical facilities are needed in both areas throughout the four years, and provision for the students for the third and fourth years must be guaranteed. It has not been established that two-year schools are economically advantageous.

17. IN AREAS WITHOUT AN EXISTING UNIVERSITY OF CALIFORNIA GENERAL CAMPUS, PROGRAMS IN POSTGRADUATE MEDICAL EDUCATION AND ALLIED HEALTH PERSONNEL TRAINING WILL BE DEVELOPED AROUND EXISTING CLINICAL FACILITIES. SUCH PROGRAMS SHOULD BE ASSOCIATED WITH ACADEMIC MEDICAL CENTERS.

In order to extend to communities without a medical school the advantages of an academically oriented medical center, including improvement of patient care and attraction of qualified physicians to the area, the development of house staff programs and clinical training of allied health personnel can be initiated in association with University of California medical centers.

18. THE UNIVERSITY OF CALIFORNIA'S MEDICAL SCHOOL PROGRAMS WILL BE RESPONSIVE TO THE NEED FOR PHYSICIANS WHO PROVIDE PRIMARY PATIENT CARE.

It is well recognized that primary, or "first contact," care by physicians suffices for the vast majority of conditions which lead patients to seek medical care. Physicians providing primary care may be trained as family practitioners or as specialists in such fields as internal medicine or pediatrics. Because there is currently no single approach which has been shown to be clearly superior, the several University of California medical schools will be encouraged to develop diverse programs for the training of primary physicians.

19. EACH UNIVERSITY OF CALIFORNIA CAMPUS WITH A MEDICAL SCHOOL WILL MAINTAIN A BALANCED PROGRAM OF UNDERGRADUATE AND POSTGRADUATE MEDICAL EDUCATION WITH A RATIO OF AT LEAST ONE INTERN OR RESIDENT IN TRAINING FOR EACH UNDERGRADUATE MEDICAL STUDENT. IN OTHER HEALTH PROFESSIONAL PROGRAMS INVOLVING POSTGRADUATE TRAINING, APPROPRIATE BALANCE WILL BE DEVELOPED BETWEEN UNDERGRADUATE PROFESSIONAL AND POSTGRADUATE ("RESIDENCY") TRAINING.

Internship and residency programs are efficient and effective in attracting medical school graduates to a given area. Interns and residents provide a large amount of patient care. Because the number of approved internships and residencies available far exceeds the number of medical school graduates, those without a medical school affiliation often remain vacant. Also, a suitable clinical teaching environment for medical students requires the presence of interns and residents. Thus, the number of medical school affiliated internships and residencies, including those in community hospitals, will be maximized.

--The number of house staff at the University's two hospitals in San Francisco and Los Angeles has grown from 433 to 598 in the last decade, and some additional growth is expected. This Ten-Year Plan projects the development of three new teaching hospitals to be located at the Davis, Irvine, and San Diego health sciences centers. Projected at these somewhat smaller hospitals by 1980 is a total of 380 house staff.

--Each of the five existing University medical schools has an affiliation with or control of a major county hospital. The house staff at these five hospitals totaled 431 in 1960, had grown under University auspices to 775 in 1970, and is projected by the University to reach at least 1,000 by 1980.

--The University is giving increasing attention to affiliations with Veterans' Administration and military hospitals, so as to take fullest advantage of clinical training opportunities in these settings. The Veterans' Administration hospital now being constructed as part of the San Diego Health Sciences Center is projected to have 150 house staff by the end of the decade. The Davis and Irvine medical schools may also see the development of V.A. hospitals at their health sciences centers, in which event additional house staff programs would be started. Several other University-V.A. affiliations exist or are being developed. The participation of staff of University medical schools in the supervision of the hospitals' programs assures improvement in the quality of the programs and helps to attract greater numbers of house staff to the hospitals.

--Therefore, the University plans the growth of house staff programs from the present level of 1,943 interns and residents in University and affiliated hospitals to a total of 3,945 by 1980.

Similarly, in a number of other health professions, postgraduate education not only provides needed training in areas of concentration of professional effort--from primary health care to subsystem specializaton--but greatly enhances undergraduate training and promotes the recruitment and retention of excellent clinical faculty.

20. THE REQUIREMENTS FOR A CALIFORNIA MEDICAL LICENSE, INCLUDING FOUR ACADEMIC YEARS OF MATRICULATION IN A MEDICAL CURRICULUM FOLLOWED BY AN INTERNSHIP, SHOULD BE MODIFIED TO REFLECT ADVANCES IN UNDERGRADUATE AND POSTGRADUATE MEDICAL EDUCATION.

    Curricular reforms and acceleration of education and training are significantly discouraged by existing rigid state medical licensure requirements. Similarly, licensure requirements for other health professions should be examined critically.

21. THE UNIVERSITY SHOULD CONTINUE TO EMPHASIZE ITS CENTRAL ROLE IN EDUCATION OF THE ACADEMIC PROFESSIONALS WHO BECOME FACULTY FOR THE EDUCATION OF ALL HEALTH PROFESSIONALS.

    The success of rapidly expanding health sciences programs in the state and community colleges as well as in the universities hinges on the availability of qualified faculty produced primarily through the University system.

22. THE UNIVERSITY WILL TAKE A LEADERSHIP ROLE IN THE ORDERLY DEVELOPMENT OF A NEW SPECTRUM OF CATEGORIES AND USE OF HEALTH WORKERS (E.G., "PHYSICIAN'S ASSISTANTS"*) WHOSE TRAINING WILL INVOLVE A RANGE OF ACADEMIC PREPARATION BELOW THE DOCTORAL LEVEL. DURING A FIVE-YEAR DEVELOPMENT PERIOD, LICENSING REQUIREMENTS FOR PLACEMENT OF THE NEW PERSONNEL SHOULD BE WAIVED TO ALLOW THE UNIVERSITY TO SUPERVISE AND EVALUATE PERSONS COMPLETING SUCH PROGRAMS. THE UNIVERSITY WILL SET A TARGET OF ABOUT 500 SUCH NEW PERSONNEL TO BE PRODUCED DURING THE FIRST FIVE YEARS, AND DIFFERENT APPROACHES AND PROGRAMS WILL BE ENCOURAGED ON THE SEVERAL CAMPUSES WITH HEALTH SCIENCES SCHOOLS.

    New categories of auxiliary health workers, such as the physician's assistant, are being generated because of the need for a more efficient health care system and the demand for more health manpower. This development is based on the assumption, tested in a number of cases, that many of the duties performed by physicians and other health professionals could be delegated to health workers who are less highly trained but could perform the tasks effectively and efficiently. The physician or other health professional would then be free to provide better health care to more people by applying his unique and undelegated professional talents and skills.

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*The term "physician's assistants" is used in this document in the generic sense, to include those often identified elsewhere by such terms as physician's assistants, physician's associates, etc.

Critical to successful development of these auxiliaries as functioning units of a health team is the role of the universities in defining tasks, evaluating the performance of these personnel, and educating and re-educating the health professions and the public as to the specific nature and parameters of these roles.

No decisions should be made on the number of persons needed in these new categories until evaluation is completed.

23. BY 1980, THE UNIVERSITY OF CALIFORNIA DENTAL CENTERS SHOULD BE PRODUCING 400 TO 500 DENTAL PROFESSIONALS AT OR ABOVE THE DOCTORATE LEVEL PER YEAR, AND EDUCATING A VARIETY OF ANCILLARY PERSONNEL. THIS WOULD BE ACCOMPLISHED BY THE PLANNED PROGRAM EXPANSION OF EXISTING SCHOOLS AND THE CREATION OF A THIRD DENTAL CENTER. THE LATTER SHOULD EMPHASIZE PREVENTION OF DENTAL PROBLEMS AND IMPROVEMENT OF METHODS OF PROVIDING SERVICE, INCLUDING MORE EFFECTIVE TRAINING AND USE OF ANCILLARY DENTAL WORKERS.

As is the case for physicians, but to a lesser degree, California is a net importer of dentists. Whether this can and should continue is doubtful. In any case, large numbers of qualified Californians are denied the opportunity to become dentists by the lack of dental school places. An increase in training programs for dental specialists is also needed to meet the changing patterns of dental care. As insurance programs which finance dental care become more common, the needs for dental care that are now unmet because of financial barriers must be accommodated.

24. A NURSING PROGRAM GENERALLY SHOULD BE AN INTEGRAL PART OF EACH UNIVERSITY HEALTH SCIENCES CAMPUS THAT HAS A MEDICAL SCHOOL. THE PRIMARY ROLE OF THE NURSING PROGRAMS WILL BE TO PRODUCE PERSONNEL WHO ARE TRAINED AT THE GRADUATE LEVEL TO SERVE AS TEACHERS, AS ADMINISTRATORS FOR COMPLEX PROGRAMS, AND AS NURSE RESEARCHERS; AND TO DEVELOP NEW NURSING SPECIALTIES. SMALL BACCALAUREATE PROGRAMS (TWENTY-FIVE TO FIFTY STUDENTS PER CLASS) WILL SERVE AS TRAINING AND RESEARCH MODELS IN THESE ESSENTIALLY GRADUATE NURSING PROGRAMS.

The future of nursing as a profession and its ultimate effectiveness as a social instrument are contingent upon the degree to which it establishes contacts with the many University disciplines requisite to its growth. The University must produce the leaders in nursing, whether the nurse educator, the nurse researcher, the nurse administrator, or the most highly specialized practitioner. The state and community colleges carry the primary responsibility for training the baccalaureate and associate degree nurses and nurse specialists needed for the practice of nursing. These various efforts in nursing education should be coordinated through the establishment of consortia of the involved institutions.

25. THE UNIVERSITY OF CALIFORNIA SHOULD AT LEAST DOUBLE ITS EFFORTS TO EDUCATE AND TRAIN STUDENTS IN PUBLIC HEALTH FIELDS INCLUDING HEALTH CARE ADMINISTRATION AND HEALTH CARE AND ENVIRONMENTAL HEALTH PLANNING. THIS COULD BE ACCOMPLISHED BY EXPANSION OF THE TWO EXISTING SCHOOLS OF PUBLIC HEALTH AND BY DEVELOPMENT OF APPROPRIATE PROGRAMS IN OTHER UNIVERSITY HEALTH SCIENCES SCHOOLS. THE UNIVERSITY'S HEALTH PROFESSIONAL SCHOOLS WILL TAKE A LEADERSHIP ROLE IN ASSISTING THE STATE AND COMMUNITY COLLEGES IN THE DEVELOPMENT AND CONTINUANCE OF PUBLIC HEALTH PROGRAMS AT AND BELOW THE BACCALAUREATE LEVEL.

Needs in disciplines falling within the category of public health are difficult to define fully. However, the supply of health professionals is inadequate for confronting such major problems as overpopulation, nutrition, effective health care delivery, health maintenance, and preservation of a satisfactory environment. Such professionals come in large part from graduate programs falling under the generic title of public health.

Undergraduate programs in biostatistics, environmental health, health education, public health laboratory, and related health areas, discontinued at the University, are now a significant part of the manpower training effort of the state and community colleges. The University will actively assist these programs to assure their linkage to relevant developments in graduate education and research.

26. THE SCHOOL OF PHARMACY SHOULD INCREASE THE NUMBER OF DOCTOR OF PHARMACY GRADUATES TO 120 PER YEAR BY 1980. TRAINING OF PHARMACISTS WILL INCLUDE CLINICAL EXPERIENCE FOR EXPANDED FUNCTIONS ON THE HEALTH CARE TEAM. UNIVERSITY MEDICAL CENTERS WITHOUT PHARMACY SCHOOLS WILL BE ENCOURAGED TO DEVELOP PROGRAMS THROUGH WHICH STUDENTS HOLDING BACHELOR'S DEGREES IN PHARMACY, BIOLOGY, OR CHEMISTRY CAN BE TRAINED AS ASSOCIATES TO PARTICIPATE IN THE PLANNING OF PATIENT THERAPY.

The capacity of the single University School of Pharmacy to produce teacher-investigators and high-level administrators should be increased. The need for assistance in avoiding drug misuse in individual patient management is increasingly evident, and should be recognized in the current and suggested new educational programs.

27. THE SCHOOL OF PHARMACY SHOULD AID IN THE DEVELOPING OF PROGRAMS TO TRAIN PHARMACY TECHNICIANS IN STATE AND COMMUNITY COLLEGES WITH ON-THE-JOB TRAINING IN APPROVED HOSPITAL PHARMACIES. ENABLING REGULATIONS BY THE STATE BOARD OF PHARMACY WILL BE NEEDED.

Rising health care costs require recognition of personnel in pharmacy at the assistant or technician level who could relieve the pharmacist of many routine duties.

Critical to successful development of these auxiliaries as functioning units of a health team is the role of the universities in defining tasks, evaluating the performance of these personnel, and educating and re-educating the health professions and the public as to the specific nature and parameters of these roles.

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Rising health care costs require recognition of personnel in pharmacy at the assistant or technician level who could relieve the pharmacist of many routine duties.

28. THE SCHOOL OF OPTOMETRY SHOULD INCREASE THE NUMBER OF PROFESSIONAL DEGREE GRADUATES TO 75 PER YEAR. DECISION ON A NEW SCHOOL OR OTHER SIGNIFICANT PROGRAM CHANGES SHOULD BE BASED ON PROPER INTERACTION BETWEEN OPTOMETRISTS AND OTHER HEALTH PROFESSIONALS. SCHOOLS OF MEDICINE AND OPTOMETRY SHOULD DEVELOP RELATIONSHIPS FOR VISION CARE SERVICES WHICH TAKE MAXIMUM ADVANTAGE OF THE CONTRIBUTION WHICH CAN BE MADE BY THE SEVERAL CATEGORIES OF HEALTH PROFESSIONALS NOW WORKING IN THE AREA.

Within the framework of efficiency and productivity, personnel within a health field should work at or near their highest level of training and in areas of their primary interests and skills. Recognition of this principle and its resolution within the vision care services is necessary. Determination of manpower needs at professional and technician levels could then follow.

29. FEASIBILITY AND PLANNING SHOULD BE UNDERTAKEN WITH REGARD TO A SECOND SCHOOL OF VETERINARY MEDICINE. COMMITMENT TO SUCH A SECOND SCHOOL SHOULD WAIT UNTIL FULL DEVELOPMENT OF THE EXISTING SCHOOL IS ASSURED.

Past studies conducted by the University in response to legislative requests have indicated the probable need for a second school of veterinary medicine. Funds for more detailed feasibility and planning studies were included in the June, 1970 Health Sciences Bond Issue Program.

Financial constraints have delayed most of the new facilities for the existing School of Veterinary Medicine at Davis. As a consequence, the Veterinary Teaching Hospital is physically remote from the rest of the school, with resultant serious operating inefficiencies. This situation should be rectified before commitments are made to a new veterinary medical school.

30. FURTHER STUDY WILL BE INITIATED CONCERNING THE APPROPRIATE UNIVERSITY ROLE IN EDUCATION OF CLINICAL PSYCHOLOGISTS AND SOCIAL WORKERS.

Responsibility for the University's programs in clinical psychology and social work lies outside the health sciences schools at least in part, and thus outside the scope of this plan. Because of their importance to the health fields, however, this recommendation is included in this report.

Health Services

31. EACH HEALTH SCIENCE CENTER WILL MAKE OPTIMUM USE OF EXISTING COMMUNITY AND OTHER CLINICAL FACILITIES BUT SHOULD ALSO HAVE ITS OWN PHYSICALLY ADJACENT HOSPITAL AS A BASE FOR TEACHING, RESEARCH, AND PROVISION OF HIGHLY SPECIALIZED REGIONAL HEALTH CARE NEEDS.

Maximum use of community clinical facilities is necessary for the University's health sciences programs, not only because it is economically advantageous, but because it is essential to

well-rounded teaching programs, particularly programs in family medicine or programs for training other primary physicians. Nevertheless, a patient care facility of at least limited size is required on or close to each University medical center so that educational, research, and highly-specialized service programs can be conducted without undue interference with the primary mission of the community facilities. There are major local and regional health care benefits from highly-specialized clinical resources, functioning as a part of the total health care resources of the region. They not only provide direct health care services, but they also make available to the region continuing education programs and such vital support facilities as health science libraries.

32. THE UNIVERSITY WILL COMMIT ITSELF TO THE DEVELOPMENT AND EVALUATION OF MODEL HEALTH CARE DELIVERY SYSTEMS WITH TWO OBJECTIVES IN MIND:

(A) TO PROVIDE A REALISTIC SETTING FOR HEALTH PROFESSIONAL EDUCATION AND ALLIED HEALTH TRAINING, AND

(B) TO ACHIEVE NEW, MORE EFFECTIVE, AND MORE ECONOMICAL MEANS TO PROVIDE SERVICES.

Improving the health care system requires experimentation with new service models; orientation to family care and health maintenance; and preparation of health professionals to function in new relationships and settings. The University is in a unique position to carry out simultaneously all these functions while providing the services necessary to support its teaching program.

Research

33. THE UNIVERSITY MUST INCREASE AND INTENSIFY ITS EFFORTS TO PRODUCE NEW KNOWLEDGE IN THE HEALTH SCIENCES--IN ORDER TO UNDERSTAND HEALTH BETTER, TO PREVENT DISEASE AND TO ORGANIZE MANPOWER AND INSTITUTIONS EFFECTIVELY FOR THE APPLICATON OF NEW KNOWLEDGE. IN FULL AWARENESS OF THE CHANGING EMPHASIS OF FEDERAL POLICY, THE STATE SHOULD ASSUME INCREASING RESPONSIBILITY FOR PROVIDING A STABLE FISCAL BASE FOR THE UNIVERSITY RESEARCH EFFORT.

In the long run, the most profound improvements in the health status of the population and the greatest cost savings have come, and will continue to come, from research.

34. THE UNIVERSITY WILL CONTINUE TO STRENGTHEN ITS PROGRAMS FOR TRAINING TEACHER-INVESTIGATORS WHILE INCREASING ITS OUTPUT OF PRACTITIONERS FOR THE BURGEONING HEALTH CARE SYSTEM. A SUITABLE PROPORTION FOR NUMBERS OF GRADUATE ACADEMIC STUDENTS TO PROFESSIONAL DEGREE CANDIDATES IN MOST HEALTH SCIENCES SCHOOLS LIES BETWEEN 20 and 40 PERCENT.

Graduate academic students in the health sciences are trained partly in the health science schools and partly on the general campuses. In either case, the programs represent recognition of the University's responsibility for the development of new basic knowledge in the health sciences and for the training of persons to increase this knowledge as investigators and to transmit it as teachers. Because of this latter function, any expanded health manpower output in other areas--such as persons to provide patient-care services--increases the requirement for graduate academic education. Augmented physician training, therefore, cannot be secured at the expense of vigorous academic education programs. Such an approach may seem to yield immediate gain, but in the longer run it is self-defeating since loss of production of graduate academics in any given year cannot be made up and will be reflected in reduced research and training capacity some years hence.

VIII. The University's Ten-Year Plan for the Health Sciences

A. Enrollment Projections

ENROLLMENT PROJECTIONS

It is the University's objective to more than double the output of health manpower within the decade. During that time period, new technology and innovations in the patterns of health care delivery will emerge. Such changes will require types of health personnel that are not even thought of at this time. It is, therefore, incumbent on the University to continue its planning in the health sciences and, where necessary, to make modifications in approaches and programs in order to meet the changing needs in delivery of health care for Californians. Related to this, and to a review of manpower needs in each health profession, the University has developed a ten-year plan which undertakes the accomplishment of the following professional program goals, which are summarized in Table 6.

Dentistry

The University plans to double the output of dental professionals at or above the doctoral level and to educate a variety of ancillary personnel. The present dental enrollment of 759 will be enlarged to over 1,400 by 1980 through increasing projected D.D.S. enrollment beyond earlier plans at both San Francisco and Los Angeles, through the creation of a third dental program, and through increases in the graduate professional and dental intern and resident programs.

Human Biology

The new School of Human Biology at San Francisco is projected to reach an enrollment of 400 by 1980. The goal of the school is to broaden the intellectual base of the campus by providing instruction and research at the graduate level in the biological, physical, social, behavioral, and environmental sciences related to health. It seeks to increase the range and academic quality of supporting disciplines available to the professional curricula and to work toward solutions of major problems relating to medical care costs, to the productivity of physicians, dentists, nurses, and pharmacists, and to the effective and efficient education and utilization of all types of health manpower, including future faculty.

Medicine

The University plans to admit 1,000 M.D. students annually by 1980, representing a 133% increase over the present level of 428. This will be realized by increasing enrollments at the five existing medical schools and by the addition of a sixth school.

Intern and resident enrollments will be increased by expanding the programs at present University operated and affiliated hospitals and through placing emphasis on new affiliations with community, county, state, and federal hospitals. A doubling of the present enrollment of interns and residents is planned. The total will reach nearly 4,000 by 1980.

While increasing its output of practitioners needed for the health care system, the University will continue to strengthen its programs

for training teacher-investigators. However, there is a reduction in previous projections of graduate academic enrollments which reflects a greater emphasis on producing physicians.

Nursing

Nursing programs will be planned as an integral part of each University health sciences campus having a medical school. The University's primary role is to produce personnel trained at the graduate level to serve as teachers, as administrators for complex programs, as nurse researchers, and as nurse specialists, but the need for nursing manpower production is also recognized through University collaboration in the training programs of state and community colleges.

Present graduate nursing programs at San Francisco and Los Angeles will be enlarged. New graduate programs are projected at both Davis and Irvine. A small baccalaureate program will be included at Davis, whereas Irvine will develop a consortium arrangement with a state college to serve as its "teaching laboratory." A fifth graduate nursing program at another of the University campuses is also projected.

The above programs will result in an increase in the graduate nursing enrollment from 339 to 781 and in R.N. enrollment from 335 to 509.

Optometry

This Plan provides for the expansion of the optometry program at Berkeley, increasing its output to about 75 graduates per year, with total enrollment growing from 198 to nearly 300.

Pharmacy

The School of Pharmacy at San Francisco will increase the number of Doctor of Pharmacy graduates to about 120 per year by 1980. The training emphasis will stress clinical experience and a new role for pharmacists as members of the health care team. The University will also take a major role in developing programs for auxiliary pharmacy personnel.

Public Health

The University will double its efforts to educate and train students in public health fields such as health care administration and environmental health planning, and the University's health professional schools will take a leadership role in assisting the state and community colleges in the development and continuance of public health programs at and below the baccalaureate level.

A larger enrollment of professional students in public health and closely related areas will be accomplished by expansion of enrollment in the University's existing schools at Berkeley and Los Angeles, and by the inauguration of new programs to educate professional public health

personnel at schools of medicine through their existing departments of community health, community medicine, or preventive medicine

Veterinary Medicine

After assuring the full development of the existing School of Veterinary Medicine at Davis, with an increase in its entering class size from 83 to at least 128, the University will undertake feasibility and planning studies with regard to expanding training for veterinarians, including the possibility of developing a second school of veterinary medicine.

Physician's Assistants

The University will take a leadership role in the orderly development of a new spectrum of categories and uses of health workers whose training will involve a range of professional preparation below the doctoral level.

At least one physician's assistants program is already underway in the University, financed by federal funds, to develop this new category of health personnel. Another of the medical schools expects to begin an experimental program in 1971, and other schools have plans nearly ready to implement programs ranging from providing additional training for returning servicemen with health care experience to educating registered nurses to become family health practitioners.

By 1975 an estimated 500 persons will have been graduated in these new categories. At this point, the University will reassess its role in the education and training of such personnel, and will also provide for evaluation of the role of these new professionals in the delivery of health care.

Other Health Professions

The University will continue to take leadership in the training of teachers for other health professional fields, such as physical therapy, medical technology, X-ray technology, and many others.

Programs in other health fields to educate personnel at and below the baccalaureate level should continue to be concentrated at community and state colleges. The University will increase its efforts to extend the activities of its existing health science centers outward through cooperative agreements with other educational institutions. It will take a leadership role in developing consortia between itself and state and community colleges to assure that clinical training needs are met most effectively. The University should retain responsibility for the standards of clinical training of health professional students in such cooperative arrangements.

Emphasis will continue to be placed on the development of clinical training programs at University and affiliated hospitals. Several hundred allied health professional students are now being trained at University hospitals; however, they are generally not included in enrollment totals, nor is their training supported by state appropriations to the University.

TABLE 6. TOTAL STUDENT ENROLLMENT BY PROFESSION

	1970/71	1979/80	% Increase
Dentistry			
D.D.S. Students	674	1,127	67.2
Graduate Professional & Other*	70	253	261.4
Graduate Academic	15	41	173.3
Total Dentistry	759	1,421	87.2
Human Biology	0	400	n/a
Medicine			
M.D. Students	1,577	3,753	137.9
Graduate Professional & Other*	2,007	4,009	99.8
Graduate Academic	383	950	148.0
Total Medicine	3,967	8,712	119.6
Nursing	674	1,290	91.4
Optometry			
O.D. Students	185	247	33.5
Graduate Professional	0	20	n/a
Graduate Academic	13	25	92.3
Total Optometry	198	292	47.5
Pharmacy			
Pharm.D. Students	352	480	36.3
Graduate Professional & Other*	4	12	200.0
Graduate Academic	45	80	77.7
Total Pharmacy	401	572	42.6
Physician's Assistants**	0	250**	n/a
Public Health & Community Health	579	1,055	82.2
Veterinary Medicine			
D.V.M. Students	313	510	62.9
Graduate Professional & Other*	26	101	288.4
Graduate Academic	98	125	27.5
Total Veterinary Medicine	437	736	68.4
Total Enrollment, All Professions	7,015	14,728	110.0

*Includes interns and residents.

**This is a 1975/76 enrollment figure. A projection is not made for 1979/80 as the 1971-76 years are developmental. After an evaluation period the University's role in this area will be reassessed.

TABLE 7. SUMMARY OF ENROLLMENT, ALL SCHOOLS

	Campus	1970/71	1971/72	1972/73	1973/74	1974/75	1975/76	1976/77	1977/78	1978/79	1979/80
Dentistry	Los Angeles	372	392	438	470	479	497	501	505	509	511
	San Francisco	387	409	421	440	482	533	585	617	624	654
	Third Program							55	106	155	256
	Total	759	801	859	910	961	1,030	1,141	1,228	1,288	1,421
Human Biology	San Francisco	0	58	80	100	150	190	230	280	340	400
Medicine	Davis	304	520	610	687	835	940	1,055	1,205	1,360	1,485
	Irvine	576	631	650	740	881	1,058	1,216	1,303	1,440	1,450
	Los Angeles	1,452	1,598	1,654	1,739	1,762	1,823	1,917	1,985	2,025	2,025
	San Diego	340	496	639	747	839	956	1,023	1,112	1,201	1,313
	San Francisco	1,295	1,331	1,367	1,380	1,402	1,472	1,531	1,645	1,756	1,839
	Sixth School						25	110	220	410	600
	Total	3,967	4,576	4,920	5,293	5,719	6,274	6,852	7,470	8,192	8,712
Nursing	Davis					10	60	105	148	188	218
	Irvine					10	30	40	60	80	100
	Los Angeles	215	230	245	250	255	265	280	300	325	350
	San Francisco	459	477	507	520	526	531	540	544	548	552
	Fifth Program							10	30	50	70
	Total	674	707	752	770	801	886	975	1,082	1,191	1,290
Optometry	Berkeley	198	219	221	221	221	239	255	271	285	292
Pharmacy	San Francisco	401	412	431	436	441	473	506	541	572	572
Physician's Assistants	Unspecified	0	25	50	125	175	250	*	*	*	*
Public Health and Community Health	Berkeley	254	261	280	310	330	370	400	415	415	415
	Los Angeles	325	324	360	380	390	400	410	420	430	440
	Unspecified			40	80	100	120	140	160	180	200
	Total	579	585	680	770	820	890	950	995	1,025	1,055
Veterinary Medicine	Davis	437	448	466	483	491	551	603	666	725	736
Total Enrollment, All Schools		7,015	7,831	8,459	9,108	9,779	10,783	11,512	12,533	13,618	14,478

*A projection is not made for these years as the 1971-76 years are developmental. After evaluation, the University's role in the Physician's Assistants Program will be reassessed.

TABLE 8. ENROLLMENT, SCHOOLS OF DENTISTRY

	1970/71	1971/72	1972/73	1973/74	1974/75	1975/76	1976/77	1977/78	1978/79	1979/80
Los Angeles										
D.D.S. Students										
First Year	95	95	110	110	110	110	110	110	110	110
Second Year	95	95	93	105	105	105	105	105	105	105
Third Year*	92	93	96	110	110	110	110	110	110	110
Fourth Year	90	90	96	96	96	110	110	110	110	110
Total	372	373	395	421	421	435	435	435	435	435
Graduate (Academic & Professional)	0	19	43	49	58	62	66	70	74	76
Total, Los Angeles	372	392	438	470	479	497	501	505	509	511
San Francisco										
D.D.S. Students										
First Year	80	80	80	80	110	110	110	110	110	136
Second Year	77	77	77	77	77	105	105	105	105	105
Third Year	72	76	76	76	76	76	105	105	105	105
Fourth Year	73	71	75	75	75	75	75	105	105	105
Total	302	304	308	308	338	366	395	425	425	451
Graduate (Acad. & Prof.) & Other	38	58	66	85	89	104	127	129	136	140
Dental Hygienists	47	47	47	47	55	63	63	63	63	63
Total, San Francisco	387	409	421	440	482	533	585	617	624	654
Third Dentistry Program										
D.D.S. Students										
First Year							50	50	50	100
Second Year								48	48	48
Third Year									47	47
Fourth Year										46
Total							50	98	145	241
Graduate (Academic & Professional)							5	8	10	15
Total, Third Program							55	106	155	256
Summary, All Schools										
Total D.D.S. Students	674	677	703	729	759	801	880	958	1,005	1,127
Total Graduate and Other Students	85	124	156	181	202	229	261	270	283	294
Total, All Schools	759	801	859	910	961	1,030	1,141	1,228	1,288	1,421

*Third-year class size increases at Los Angeles relate to admission of transfer students.

TABLE 9. ENROLLMENT, SCHOOL OF HUMAN BIOLOGY

	1970/71	1971/72	1972/73	1973/74	1974/75	1975/76	1976/77	1977/78	1978/79	1979/80
San Francisco										
Graduate (Acad. & Prof.)	58	80	100	150	190	230	280	340	400	

TABLE 10. ENROLLMENT, SCHOOLS OF MEDICINE

Davis										
M.D. Students										
First Year	51	100	100	100	150	150	150	150	175	175
Second Year	50	52	100	100	100	150	150	150	150	175
Third Year	47	53	52	100	100	100	150	150	150	150
Fourth Year	0	49	53	52	100	100	100	150	150	150
Total	148	254	305	352	450	500	550	600	625	650
Interns and Residents	132	220	245	265	295	320	360	450	570	660
Graduate Academic	24	46	60	70	90	120	145	155	165	175
Total, Davis	304	520	610	687	835	940	1,055	1,205	1,360	1,485
Irvine										
M.D. Students										
First Year	63	63	63	128	128	150	150	150	150	150
Second Year	62	62	62	62	128	128	150	150	150	150
Third Year	63	63	63	63	63	128	128	150	150	150
Fourth Year	63	62	62	62	62	62	128	128	150	150
Total	251	250	250	315	381	468	556	578	600	600
Interns and Residents	325	342	350	360	420	495	550	600	700	700
Graduate Academic	0	39	50	65	80	95	110	125	140	150
Total, Irvine	576	631	650	740	881	1,058	1,216	1,303	1,440	1,450

TABLE 10.--Continued

	1970/71	1971/72	1972/73	1973/74	1974/75	1975/76	1976/77	1977/78	1978/79	1979/80
Los Angeles										
M.D. Students										
First Year	127	133	133	133	133	175	200	200	200	200
Second Year	128	130	133	133	133	133	175	200	200	200
Third Year*	128	128	140	148	153	157	160	200	200	200
Fourth Year	114	127	128	140	148	153	157	160	200	200
Total	497	518	534	554	567	618	692	760	800	800
Interns and Residents	770	890	910	970	980	990	1,000	1,000	1,000	1,000
Graduate Academic**	185	190	210	215	215	215	225	225	225	225
Total, Los Angeles	1,452	1,598	1,654	1,739	1,762	1,823	1,917	1,985	2,025	2,025
San Diego										
M.D. Students										
First Year	53	56	96	96	96	128	128	150	150	150
Second Year	48	56	56	96	96	96	128	128	150	150
Third Year	48	54	56	56	96	96	96	128	128	150
Fourth Year	0	49	54	56	56	96	96	96	128	128
Total	149	215	262	304	344	416	448	502	556	578
Interns and Residents	142	222	302	353	395	430	455	480	505	585
Graduate Academic	49	59	75	90	100	110	120	130	140	150
Total, San Diego	340	496	639	747	839	956	1,023	1,112	1,201	1,313

*Third-year class size increases at Los Angeles relate to transfer of students from two-year schools of medicine.

**The Los Angeles School of Medicine is responsible for basic sciences teaching of dental students; 25 related graduate academic students are counted in the School of Medicine.

TABLE 10.--Continued

	1970/71	1971/72	1972/73	1973/74	1974/75	1975/76	1976/77	1977/78	1978/79	1979/80
San Francisco										
M.D. Students										
First Year	134	140	146	146	146	175	175	200	200	200
Second Year	134	134	140	146	146	146	175	175	200	200
Third Year	134	138	134	140	146	146	146	175	175	200
Fourth Year	130	132	138	134	140	146	146	146	175	175
Total	532	544	558	566	578	613	642	696	750	775
Interns and Residents	574	590	600	600	600	625	650	700	750	800
Graduate Academic	125	133	145	150	160	170	175	185	192	200
Other Health Science Students	64	64	64	64	64	64	64	64	64	64
Total, San Francisco	1,295	1,331	1,367	1,380	1,402	1,472	1,531	1,645	1,756	1,839
Sixth School of Medicine										
M.D. Students										
First Year							50	50	125	125
Second Year								50	50	125
Third Year									50	50
Fourth Year										50
Total							50	100	225	350
Interns and Residents						25	50	100	150	200
Graduate Academic							10	20	35	50
Total, Sixth School						25	110	220	410	600
Summary, All Medical Schools										
Total M.D. Students	1,577	1,781	1,909	2,091	2,320	2,615	2,938	3,236	3,556	3,753
Total Interns and Residents	1,943	2,264	2,407	2,548	2,690	2,885	3,065	3,330	3,675	3,945
Total Graduate Academic	383	467	540	590	645	710	785	840	897	950
Total Other Health Science	64	64	64	64	64	64	64	64	64	64
Total, All Schools	3,967	4,576	4,920	5,293	5,719	6,274	6,852	7,470	8,192	8,712

TABLE 11. ENROLLMENT, SCHOOLS & PROGRAMS OF NURSING

	1970/71	1971/72	1972/73	1973/74	1974/75	1975/76	1976/77	1977/78	1978/79	1979/80
Davis										
B.S. Students (R.N.)										
First Year						30	30	30	50	50
Second Year							25	25	25	45
Third Year								23	23	23
Total						30	55	78	98	118
Graduate (Academic & Professional)					10	30	50	70	90	100
Total, Davis					10	60	105	148	188	218
Irvine										
Graduate (Academic & Professional)					10	30	40	60	80	100
Total, Irvine					10	30	40	60	80	100
Los Angeles										
B.S. Students (R.N.)										
First Year	35	35	38	38	38	38	38	38	38	38
Second Year	55	55	57	57	57	57	57	57	57	57
Total	90	90	95	95	95	95	95	95	95	95
Graduate (Academic & Professional)	125	140	150	155	160	170	185	205	230	255
Total, Los Angeles	215	230	245	250	255	265	280	300	325	350

TABLE 11.--Continued

	1970/71	1971/72	1972/73	1973/74	1974/75	1975/76	1976/77	1977/78	1978/79	1979/80
San Francisco										
B.S. Students (R.N.)										
First Year	93	104	104	104	104	104	104	104	104	104
Second Year	73	88	98	98	98	98	98	98	98	98
Third Year	79	71	86	94	94	94	94	94	94	94
Total	245	263	288	296	296	296	296	296	296	296
Graduate (Acad. & Prof.) & Other	214	214	219	224	230	235	244	248	252	256
Total, San Francisco	459	477	507	520	526	531	540	544	548	552
Fifth Nursing Program										
Graduate (Academic & Professional)							10	30	50	70
Total, Fifth Program							10	30	50	70
Summary, All Schools & Programs										
Total B.S. Students (R.N.)	335	353	383	391	391	421	446	469	489	509
Total Graduate (Academic & Prof.)	339	354	369	379	410	465	529	613	702	781
Total, All Schools & Programs	674	707	752	770	801	886	975	1,082	1,191	1,290

TABLE 12. ENROLLMENT, SCHOOL OF OPTOMETRY

	1970/71	1971/72	1972/73	1973/74	1974/75	1975/76	1976/77	1977/78	1978/79	1979/80
Berkeley										
O.D. Students										
First Year	54	58	58	58	58	71	71	71	71	71
Second Year	50	54	54	54	54	54	65	65	65	65
Third Year	50	48	50	50	50	50	50	59	59	59
Fourth Year	31	46	46	46	46	46	46	46	52	52
Total	185	206	208	208	208	221	232	241	247	247
Graduate (Academic & Professional)	13	13	13	13	13	18	23	30	38	45
Total, Berkeley	198	219	221	221	221	239	255	271	285	292

TABLE 13. ENROLLMENT, SCHOOL OF PHARMACY

San Francisco										
Pharm.D. Students										
First Year	93	93	93	93	93	120	120	120	120	120
Second Year	86	91	91	91	91	91	120	120	120	120
Third Year	83	86	91	91	91	91	91	120	120	120
Fourth & Fifth Year	90	88	91	91	91	91	91	91	120	120
Total	352	358	366	366	366	393	422	451	480	480
Graduate (Acad. & Prof.) & Other	49	54	65	70	75	80	85	90	92	92
Total, San Francisco	401	412	431	436	441	473	506	541	572	572

TABLE 14. ENROLLMENT, PHYSICIAN'S ASSISTANTS PROGRAMS*

Health Sciences Campuses					
Total	25	50	125	175	250

*A projection is not made for years subsequent to 1975/76 since this is an experimental program. After evaluation, the University's role in the program will be reassessed.

TABLE 15. ENROLLMENT, PUBLIC HEALTH AND COMMUNITY HEALTH

	1970/71	1971/72	1972/73	1973/74	1974/75	1975/76	1976/77	1977/78	1978/79	1979/80
Schools of Public Health										
Berkeley										
Graduate (Academic & Prof.)	254	261	280	310	330	370	400	415	415	415
Los Angeles										
B.S. Students	15	0	0	0	0	0	0	0	0	0
Graduate (Academic & Prof.)	310	324	360	380	390	400	410	420	430	440
Total, Los Angeles	325	324	360	380	390	400	410	420	430	440
Total, Public Health	579	585	640	690	720	770	810	835	845	855
Community Health Programs										
Health Sciences Campuses										
Graduate (Academic & Prof.)			40	80	100	120	140	160	180	200
Summary, Public Health & Community Health										
Total B.S. Students	15	0	0	0	0	0	0	0	0	0
Total Graduate (Acad. & Prof.)	564	585	680	770	820	890	950	995	1,025	1,055
Total, All Schools & Programs	579	585	680	770	820	890	950	995	1,025	1,055

TABLE 16. ENROLLMENT, SCHOOL OF VETERINARY MEDICINE

	1970/71	1971/72	1972/73	1973/74	1974/75	1975/76	1976/77	1977/78	1978/79	1979/80
Davis										
D.V.M. Students										
First Year	83	83	85	85	85	128	128	128	128	128
Second Year	76	81	83	85	85	85	128	128	128	128
Third Year	78	78	81	83	85	85	85	127	127	127
Fourth Year	76	76	77	80	82	84	84	84	127	127
Total	313	318	326	333	337	382	425	467	510	510
Interns	14	20	24	28	32	36	40	45	50	55
Graduate Academic	98	97	100	100	100	105	110	120	125	125
Master of Preventive Vet. Med.	12	13	16	22	22	28	28	34	40	46
Total, Davis	437	448	466	483	491	551	603	666	725	736

B. Operating Budget

OPERATING BUDGET

Tables 17 through 30 provide operating budget projections for the period 1970-1980. Table 17 compares the current year's total budgeted expenditures with the projection for 1979/80. Annual instruction and departmental research expenditures would increase from $45 million to $91 million over the decade. Taking into account total expenditures, including the budgets of teaching hospitals, budgeted fund requirements from the state would grow from $55 million to $115 million per year.

Notes on Operating Budget Projections:

Pending final action on the provisions of Reorganization Plan No. 1 of 1970, which turns the operation of the neuropsychiatric institutes at San Francisco and Los Angeles over to the University, budget projections are not included for these facilities.

The University recognizes the possibility that over the coming decade major new federal and state health programs, as well as Medicare and Medicaid, may further reduce medical indigency and thereby reduce the University's requirements for clinical teaching support funds. While this Plan does not project a reduction of such support below the current level, the University is committed to attempting to reduce this category of expenditure as circumstances permit.

Budget projections are made in terms of current dollars. No provision is included for economic inflationary increases or for technological advances.

TABLE 17. OPERATING EXPENDITURES AND SOURCES OF FUNDS
(dollars in thousands)

	1970/71	1979/80	% Increase
Expenditures			
Instruction & Departmental Research*			
Dentistry	4,027	9,132	126.8
Human Biology	32	1,163	
Medicine	33,097	68,324	106.4
Nursing	1,584	3,167	99.9
Optometry	255	475	86.3
Pharmacy	1,222	1,688	38.1
Public Health & Community Health	1,737	2,694	55.1
Veterinary Medicine	2,903	4,803	65.4
Total, Instruction & Departmental Research	44,857	91,446	103.9
Teaching Hospitals	86,049	171,919	99.8
Organized Activities - Other	4,244	5,816	37.0
Organized Research (Budgeted Only)	3,149	3,666	16.4
Total, Expenditures	138,299	272,847	97.3
Sources of Funds			
State of California	54,715	114,693	109.6
U.C. General	1,193	1,305	9.4
U.C. Restricted			
State of California	122	122	
U.S. Government	154	154	
Endowments, Gifts, Grants	1,233	1,233	
Faculty Compensation Plans	3,407	8,002	134.9
Teaching Hospital Income	73,761	142,721	93.5
Other Sources	3,714	4,617	24.3
Total U.C. Restricted	82,391	156,849	90.4
Total Sources of Funds	138,299	272,847	97.3

*No figures are included on this table for Physician's Assistants Programs as they will begin in 1971/72; as these programs are on a five-year experimental basis, no projections are included in this Plan past 1975/76.

TABLE 18. SUMMARY OF OPERATING EXPENDITURES AND SOURCES OF FUNDS
ALL SCHOOLS AND RELATED ACTIVITIES
(dollars in thousands)

	1970/71	1971/72	1972/73	1973/74	1974/75	1975/76	1976/77	1977/78	1978/79	1979/80
Instruction and Departmental Research										
State and General Funds	$ 41,117	$ 45,351	$ 47,659	$ 50,972	$ 55,287	$ 61,679	$ 66,962	$ 73,143	$ 78,999	$ 83,111
Non-State Funds	3,740	4,878	5,357	5,866	6,030	6,530	6,941	7,377	7,966	8,335
Total	$ 44,857	$ 50,229	$ 53,016	$ 56,838	$ 61,317	$ 68,209	$ 73,903	$ 80,520	$ 86,965	$ 91,446
Teaching Hospitals										
State Funds	$ 12,221	$ 14,950	$ 15,717	$ 16,451	$ 18,982	$ 22,179	$ 23,795	$ 24,205	$ 26,752	$ 29,131
Non-State Funds	73,828	80,620	82,412	84,528	85,976	96,663	104,669	116,173	130,305	142,788
Total	$ 86,049	$ 95,570	$ 98,129	$100,979	$104,958	$118,842	$128,464	$140,378	$157,057	$171,919
Organized Activities--Other										
State Funds	$ 870	$ 1,090	$ 1,141	$ 1,176	$ 1,189	$ 1,230	$ 1,330	$ 1,336	$ 1,438	$ 1,539
Non-State Funds	3,374	3,635	3,710	3,761	3,781	3,837	3,959	3,968	4,122	4,277
Total	$ 4,244	$ 4,725	$ 4,851	$ 4,937	$ 4,970	$ 5,067	$ 5,289	$ 5,304	$ 5,560	$ 5,816
Organized Research										
State Funds	$ 1,822	$ 1,924	$ 1,961	$ 1,994	$ 2,031	$ 2,105	$ 2,176	$ 2,243	$ 2,304	$ 2,339
Non-State Funds	1,327	1,327	1,327	1,327	1,327	1,327	1,327	1,327	1,327	1,327
Total	$ 3,149	$ 3,251	$ 3,288	$ 3,321	$ 3,358	$ 3,432	$ 3,503	$ 3,570	$ 3,631	$ 3,666
Total, Health Sciences										
State and General Funds	$ 56,030	$ 63,315	$ 66,478	$ 70,593	$ 77,489	$ 87,193	$ 94,263	$100,927	$109,493	$116,120
Non-State Funds	82,269	90,460	92,806	95,482	97,114	108,357	116,896	128,845	143,720	156,727
Total	$138,299	$153,775	$159,284	$166,075	$174,603	$195,550	$211,159	$229,772	$253,213	$272,847

TABLE 19. SCHOOLS OF DENTISTRY
SUMMARY OF OPERATING EXPENDITURES: INSTRUCTION & DEPARTMENTAL RESEARCH
(dollars in thousands)

	1970/71	1971/27	1972/73	1973/74	1974/75	1975/76	1976/77	1977/78	1978/79	1979/80
Los Angeles										
State and General Funds	$ 1,856	$ 2,073	$ 2,355	$ 2,559	$ 2,610	$ 2,738	$ 2,763	$ 2,789	$ 2,814	$ 2,814
Non-State Funds	207	264	264	264	264	264	264	264	264	264
San Francisco										
State and General Funds	1,940	2,207	2,357	2,643	2,873	3,153	3,459	3,663	3,663	3,816
Non-State Funds	24	24	24	24	24	24	24	24	24	24
Third Program										
State and General Funds				49	570	852	1,180	1,548	1,860	2,214
Totals, Schools of Dentistry										
State and General Funds	$ 3,796	$ 4,280	$ 4,712	$ 5,251	$ 6,053	$ 6,743	$ 7,402	$ 8,000	$ 8,337	$ 8,844
Non-State Funds	$ 231	$ 288	$ 288	$ 288	$ 288	$ 288	$ 288	$ 288	$ 288	$ 288

TABLE 20. SCHOOL OF HUMAN BIOLOGY
SUMMARY OF OPERATING EXPENDITURES: INSTRUCTION & DEPARTMENTAL RESEARCH
(dollars in thousands)

San Francisco										
State and General Funds	$ 32	$ 251	$ 548	$ 548	$ 548	$ 585	$ 696	$ 830	$ 1,007	$ 1,163

TABLE 21. SCHOOLS OF MEDICINE
SUMMARY OF OPERATING EXPENDITURES: INSTRUCTION & DEPARTMENTAL RESEARCH
(dollars in thousands)

	1970/71	1971/72	1972/73	1973/74	1974/75	1975/76	1976/77	1977/78	1978/79	1979/80
Davis										
State and General Funds	$ 4,068	$ 4,804	$ 5,133	$ 5,816	$ 6,346	$ 7,046	$ 7,761	$ 9,006	$10,078	$11,075
Non-State Funds	467	1,006	1,290	1,472	1,632	1,883	2,130	2,355	2,730	2,930
Irvine										
State and General Funds	3,422	3,570	3,580	3,865	4,713	6,194	7,354	7,977	8,762	8,895
Non-State Funds	7	7	7	7	7	7	7	7	7	7
Los Angeles										
State and General Funds	8,561	9,866	10,283	10,784	11,072	11,632	12,440	13,117	13,897	13,762
Non-State Funds	708	900	900	900	900	900	900	900	900	900
San Diego										
State and General Funds	5,005	5,707	5,748	5,875	5,972	6,820	7,327	7,979	8,629	9,624
Non-State Funds	469	802	986	1,303	1,303	1,514	1,646	1,822	2,001	2,163
San Francisco										
State and General Funds	8,757	9,066	9,189	9,363	9,593	10,043	10,465	11,334	12,174	12,789
Non-State Funds	1,633	1,642	1,642	1,642	1,642	1,642	1,642	1,642	1,642	1,642
Sixth School										
State and General Funds				393	1,447	2,058	2,807	3,496	4,077	4,537
Totals, Schools of Medicine										
State and General Funds	$29,813	$33,013	$33,933	$36,096	$39,143	$43,793	$48,154	$52,909	$57,617	$60,682
Non-State Funds	$ 3,284	$ 4,357	$ 4,825	$ 5,324	$ 5,484	$ 5,946	$ 6,325	$ 6,726	$ 7,280	$ 7,642

TABLE 22. SCHOOLS AND PROGRAMS OF NURSING
SUMMARY OF OPERATING EXPENDITURES: INSTRUCTION & DEPARTMENTAL RESEARCH
(dollars in thousands)

	1970/71	1971/72	1972/73	1973/74	1974/75	1975/76	1976/77	1977/78	1978/79	1979/80
Davis										
State and General Funds				$ 40	$ 140	$ 289	$ 398	$ 478	$ 509	$ 568
Irvine										
State and General Funds				40	121	121	140	177	207	250
Los Angeles										
State and General Funds	$ 465	$ 465	$ 512	541	570	589	623	659	712	810
San Francisco										
State and General Funds	1,104	1,210	1,227	1,277	1,277	1,280	1,298	1,316	1,316	1,344
Non-State Funds	15	15	15	15	15	15	15	15	15	15
Fifth Program										
State and General Funds						20	121	121	153	180
Totals, Schools and Programs of Nursing										
State and General Funds	$ 1,569	$ 1,675	$ 1,739	$ 1,898	$ 2,108	$ 2,299	$ 2,580	$ 2,751	$ 2,897	$ 3,152
Non-State Funds	$ 15	$ 15	$ 15	$ 15	$ 15	$ 15	$ 15	$ 15	$ 15	$ 15

TABLE 23. SCHOOL OF OPTOMETRY
SUMMARY OF OPERATING EXPENDITURES: INSTRUCTION & DEPARTMENTAL RESEARCH
(dollars in thousands)

	1970/71	1971/72	1972/73	1973/74	1974/75	1975/76	1976/77	1977/78	1978/79	1979/80
Berkeley										
State and General Funds	$ 255	$ 255	$ 383	$ 383	$ 383	$ 401	$ 419	$ 456	$ 475	$ 475

TABLE 24. SCHOOL OF PHARMACY
SUMMARY OF OPERATING EXPENDITURES: INSTRUCTION & DEPARTMENTAL RESEARCH
(dollars in thousands)

San Francisco										
State and General Funds	$ 1,214	$ 1,264	$ 1,319	$ 1,345	$ 1,371	$ 1,448	$ 1,526	$ 1,604	$ 1,680	$ 1,680
Non-State Funds	8	8	8	8	8	8	8	8	8	8

TABLE 25. PHYSICIAN'S ASSISTANTS PROGRAMS
SUMMARY OF OPERATING EXPENDITURES: INSTRUCTION & DEPARTMENTAL RESEARCH
(dollars in thousands)

Health Sciences Campuses										
State and General Funds	$ 0	$ 0	$ 138	$ 322	$ 437	$ 644				

*A projection is not made for years subsequent to 1975-76 since this is an experimental program. After evaluation, the University's role in the program will be reassessed. While an enrollment of 25 is projected in 1971/72, this program was conceived too late for inclusion in the University budget for that year. It will be financed initially by extramural funds.

TABLE 26. SCHOOLS OF PUBLIC HEALTH AND COMMUNITY HEALTH
SUMMARY OF OPERATING EXPENDITURES: INSTRUCTION & DEPARTMENTAL RESEARCH
(dollars in thousands)

	1970/71	1971/72	1972/73	1973/74	1974/75	1975/76	1976/77	1977/78	1978/79	1979/80
Schools of Public Health										
Berkeley										
State and General Funds	$ 1,008	$ 1,008	$ 1,008	$ 1,008	$ 1,008	$ 1,065	$ 1,108	$ 1,122	$ 1,122	$ 1,122
Los Angeles										
State and General Funds	729	766	878	935	975	1,014	1,053	1,076	1,097	1,119
Totals, Public Health										
State and General Funds	1,737	1,774	1,886	1,943	1,983	2,079	2,161	2,198	2,219	2,241
Community Health Programs										
Health Sciences Campuses										
State and General Funds			87	173	216	281	324	367	411	453
Summary, Public Health and Community Health										
State and General Funds	$ 1,737	$ 1,774	$ 1,973	$ 2,116	$ 2,199	$ 2,360	$ 2,485	$ 2,565	$ 2,630	$ 2,694

TABLE 27. SCHOOL OF VETERINARY MEDICINE
SUMMARY OF OPERATING EXPENDITURES: INSTRUCTION & DEPARTMENTAL RESEARCH
(dollars in thousands)

Davis										
State and General Funds	$ 2,701	$ 2,839	$ 2,914	$ 3,013	$ 3,045	$ 3,406	$ 3,700	$ 4,028	$ 4,356	$ 4,421
Non-State Funds	202	210	221	231	235	273	305	340	375	382

TABLE 28. TEACHING HOSPITALS: SUMMARY OF OPERATING EXPENDITURES
(dollars in thousands)

	1970/71	1971/72	1972/73	1973/74	1974/75	1975/76	1976/77	1977/78	1978/79	1979/80
Human Medicine Hospitals										
Davis (Sacramento Medical Center & Planned Campus Hospital)										
State Funds	$ 100	$ 300	$ 500	$ 550	$ 770	$ 1,230	$ 3,250	$ 4,717	$ 3,865	$ 2,503
Non-State Funds								9,505	12,258	14,185
Total	$ 100	$ 300	$ 500	$ 550	$ 770	$ 1,230	$ 3,250	$14,222	$16,123	$16,688
Irvine (Orange Co. Medical Center & Planned Campus Hospital)										
State Funds	$ 100	$ 300	$ 555	$ 935	$ 3,020	$ 5,528	$ 4,013	$ 2,476	$ 3,373	$ 3,616
Non-State Funds						9,177	12,032	14,031	19,112	20,491
Total	$ 100	$ 300	$ 555	$ 935	$ 3,020	$14,705	$16,045	$16,507	$22,485	$24,107
Los Angeles (Campus Hospital)										
State Funds	$ 4,297	$ 5,949	$ 6,126	$ 6,187	$ 6,249	$ 6,310	$ 6,371	$ 6,371	$ 6,371	$ 6,371
Non-State Funds	28,895	33,840	34,716	35,062	35,408	35,755	36,101	36,101	36,101	36,101
Total	$33,192	$39,789	$40,842	$41,249	$41,657	$42,065	$42,472	$42,472	$42,472	$42,472
San Diego (University Hospital of San Diego Co. & Planned Campus Hospital)										
State Funds	$ 2,158	$ 2,599	$ 2,628	$ 2,806	$ 2,899	$ 3,006	$ 3,231	$ 3,591	$ 5,611	$ 8,089
Non-State Funds	19,872	21,130	21,480	22,935	23,699	24,573	25,432	25,432	25,432	34,609
Total	$22,030	$23,729	$24,108	$25,741	$26,598	$27,579	$28,663	$29,023	$31,043	$42,698
San Francisco (Campus Hospital)										
State Funds	$ 4,977	$ 5,196	$ 5,302	$ 5,367	$ 5,438	$ 5,499	$ 6,324	$ 6,324	$ 6,446	$ 6,446
Non-State Funds	24,259	24,778	25,344	25,659	25,997	26,286	30,232	30,232	36,530	36,530
Total	$29,236	$29,974	$30,646	$31,026	$31,435	$31,785	$36,556	$36,556	$42,976	$42,976
Sixth Medical School (Campus Hospital)										
State Funds								$ 120	$ 480	$ 1,500

TABLE 28.--Continued

	1970/71	1971/72	1972/73	1973/74	1974/75	1975/76	1976/77	1977/78	1978/79	1979/80
Summary--Human Medicine Hospitals										
State Funds	$ 11,632	$ 14,344	$ 15,111	$ 15,845	$ 18,376	$ 21,573	$ 23,189	$ 23,599	$ 26,146	$ 28,525
Non-State Funds	73,026	79,748	81,540	83,656	85,104	95,791	103,797	115,301	129,433	141,916
Total	$ 84,658	$ 94,092	$ 96,651	$ 99,501	$103,480	$117,364	$126,986	$138,900	$155,579	$170,441
Veterinary Medicine Hospital, Davis										
State Funds	$ 589	$ 606	$ 606	$ 606	$ 606	$ 606	$ 606	$ 606	$ 606	$ 606
Non-State Funds	802	872	872	872	872	872	872	872	872	872
Total	$ 1,391	$ 1,478	$ 1,478	$ 1,478	$ 1,478	$ 1,478	$ 1,478	$ 1,478	$ 1,478	$ 1,478
Summary--Teaching Hospitals										
State Funds	$ 12,221	$ 14,950	$ 15,717	$ 16,451	$ 18,982	$ 22,179	$ 23,795	$ 24,205	$ 26,752	$ 29,131
Non-State Funds	73,828	80,620	82,412	84,528	85,976	96,663	104,669	116,173	130,305	142,788
Total	$ 86,049	$ 95,570	$ 98,129	$100,979	$104,958	$118,842	$128,464	$140,378	$157,057	$171,919

TABLE 29. ORGANIZED ACTIVITIES - OTHER: SUMMARY OF OPERATING EXPENDITURES*
(dollars in thousands)

	1970/71	1971/72	1972/73	1973/74	1974/75	1975/76	1976/77	1977/78	1978/79	1979/80
Berkeley										
Non-State Funds	$ 195	$ 195	$ 195	$ 195	$ 195	$ 195	$ 195	$ 195	$ 195	$ 195
Davis										
State Funds	$ 40	$ 40	$ 40	$ 40	$ 40	$ 40	$ 40	$ 40	$ 40	$ 40
Los Angeles										
State Funds	$ 366	$ 543	$ 583	$ 611	$ 623	$ 648	$ 650	$ 656	$ 661	$ 664
Non-State Funds	454	664	725	768	786	823	826	835	843	847
Total	$ 820	$1,207	$1,308	$1,379	$1,409	$1,471	$1,476	$1,491	$1,504	$1,511
San Diego										
State Funds	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60
San Francisco										
State Funds	$ 404	$ 447	$ 458	$ 465	$ 466	$ 482	$ 580	$ 580	$ 580	$ 583
Non-State Funds	2,725	2,776	2,790	2,798	2,800	2,819	2,938	2,938	2,938	2,945
Total	$3,129	$3,223	$3,248	$3,263	$3,266	$3,301	$3,518	$3,518	$3,518	$3,528
Third Dental School Clinic										
State Funds									$ 97	$ 192
Non-State Funds									146	290
Total									$ 243	$ 482
Summary--Other Organized Activities										
State Funds	$ 870	$1,090	$1,141	$1,176	$1,189	$1,230	$1,330	$1,336	$1,438	$1,539
Non-State Funds	3,374	3,635	3,710	3,761	3,781	3,837	3,959	3,968	4,122	4,277
Total	$4,244	$4,725	$4,851	$4,937	$4,970	$5,067	$5,289	$5,304	$5,560	$5,816

* Included in this function are those activities (aside from the teaching hospitals, which are shown separately) that are operated for the purpose of supporting the various health sciences educational programs. Many of these activities, such as the optometry clinic at Berkeley and certain support laboratories and clinics at San Francisco, are largely self-supporting from service charges to users. Other activities, such as the dental clinics and vivaria, require some state support in addition to user charges.

TABLE 30. ORGANIZED RESEARCH: SUMMARY OF EXPENDITURES*
(dollars in thousands)

	1970/71	1971/72	1972/73	1973/74	1974/75	1975/76	1976/77	1977/78	1978/79	1979/80
Berkeley										
State Funds	$ 103	$ 133	$ 136	$ 136	$ 136	$ 138	$ 140	$ 142	$ 142	$ 142
Non-State Funds	15	15	15	15	15	15	15	15	15	15
Total	$ 118	$ 148	$ 151	$ 151	$ 151	$ 153	$ 155	$ 157	$ 157	$ 157
Davis										
State Funds	$ 597	$ 618	$ 627	$ 638	$ 647	$ 666	$ 683	$ 702	$ 719	$ 731
Non-State Funds	177	177	177	177	177	177	177	177	177	177
Total	$ 774	$ 795	$ 804	$ 815	$ 824	$ 843	$ 860	$ 879	$ 896	$ 908
Irvine										
State Funds	$ 40	$ 40	$ 40	$ 42	$ 59	$ 76	$ 93	$ 100	$ 112	$ 112
Los Angeles										
State Funds	$ 119	$ 142	$ 155	$ 166	$ 170	$ 180	$ 193	$ 204	$ 212	$ 214
Non-State Funds	251	251	251	251	251	251	251	251	251	251
Total	$ 370	$ 393	$ 406	$ 417	$ 421	$ 431	$ 444	$ 455	$ 463	$ 465
San Diego										
State Funds	$ 33	$ 46	$ 47	$ 51	$ 51	$ 63	$ 69	$ 78	$ 87	$ 96
San Francisco										
State Funds	$ 930	$ 945	$ 956	$ 961	$ 968	$ 982	$ 998	$1,017	$1,032	$1,044
Non-State Funds	884	884	884	884	884	884	884	884	884	844
Total	$1,814	$1,829	$1,840	$1,845	$1,852	$1,866	$1,882	$1,901	$1,916	$1,928
Summary-Organized Research										
State Funds	$1,822	$1,924	$1,961	$1,994	$2,031	$2,105	$2,176	$2,243	$2,304	$2,339
Non-State Funds	1,327	1,327	1,327	1,327	1,327	1,327	1,327	1,327	1,327	1,327
Total	$3,149	$3,251	$3,288	$3,321	$3,358	$3,432	$3,503	$3,570	$3,631	$3,666

* Excludes extramural support which is estimated at $47.9 million in 1970/71 for the six campuses with health sciences schools. While additional state support of organized research is recommended in this report, no significant increase is projected.

C. Capital Outlay Program

CAPITAL OUTLAY PROGRAM

The estimate of total capital requirements for the ten-year period, stated in current dollars, is slightly under $485 million.

The University would expect to receive major federal support toward funding this total, and would also plan to fund a significant amount of hospital construction from loan funds. It is estimated that a maximum of 60 percent of the total might be financed from non-state sources. (This estimate is based on current federal legislation for health science construction grants, as well as the University's current plans for hospital funding.)

Given maximum non-state funding, the estimated state funding requirement for the ten-year period would be $190 million, or somewhat less than the total (without provision for increase in construction costs or reserve for shortfall in federal funds) that was included in Proposition 1, the Health Sciences Bond Issue, in June of 1970, a shorter-term program with much lesser goals.

While the largest percentage increases in enrollment proposed in the present plan are in the more costly programs such as medicine, in recognition of limited resources, the University adjusted its planning to seek more efficient and economical methods which would significantly increase the production of health care personnel within this decade.

Notes on the Capital Program:

Capital budget projections in this Plan do not reflect the possible need for major alterations of the University's experimental animal facilities to meet new federal requirements. The University does not now have adequate information to estimate the total costs accurately or to reflect possible federal fund participation.

A capital projection is not made for the physician's assistant program, as that program is included in this plan on a five-year experimental basis. Necessary space will be obtained on a rental or other temporary basis during the initial period.

No capital projection has been made for the enlargement of public-health-related community health programs. The University would plan to meet this projection of 200 students at several of the existing medical schools. At those campuses with "surge" buildings, it has been assumed that space needs through 1979/80 can be met in those facilities as the medical schools move to permanent quarters.

During the time period reflected in this Plan, no permanent capital

facilities are programmed for the new nursing schools or programs at Davis and Irvine. These programs would be accommodated in medical school surge space after that space is vacated by the medical schools.

Initial action has been taken by the state to turn the operation of the neuropsychiatric institutes at San Francisco and Los Angeles over to the University. Additional study will be required to determine future capital needs for the institutes.

Estimates for the sixth medical school are based on the assumption of major capital economies obtainable by relying heavily on existing campus and community resources, in keeping with planning to date by the Berkeley campus.

Capital projections are based on current construction costs.

TABLE 31. CAPITAL OUTLAY SCHEDULE BY PROGRAM
(dollars in millions)

Dentistry	
Los Angeles	$ 5.2
San Francisco	29.6
Third Program	15.3
Total	50.1
Human Biology	
San Francisco	1.6
Medicine	
Davis	91.7
Irvine	81.6
Los Angeles	24.1
San Diego	72.5
San Francisco	64.1
Sixth School	51.4
Total	385.4
Nursing	
Davis	.3
Irvine	.1
Los Angeles	3.0
San Francisco	.3
Fifth Program	1.0
Total	4.6
Optometry	
Berkeley	5.6
Pharmacy	
San Francisco	1.1
Public Health	
Berkeley	10.0
Los Angeles	0
Total	10.0
Veterinary Medicine	
Davis	25.9
Total Capital Outlay	$484.6*

*Includes non-state funds, maximum approximately $294 million.

TABLE 32. CAPITAL OUTLAY SCHEDULE BY YEAR
(dollars in millions)

	Total
1970/71	$ 14.4
1971/72	51.7
1972/73	68.3
1973/74	101.7
1974/75	52.2
1975/76	77.7
1976/77	47.9
1977/78	45.7
1978/79	17.5
1979/80	7.5
Total	$ 484.6*

*Includes non-state funds, maximum approximately $294 million